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STATEMENT OF
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ENERGY AND MINERALS DIVISION
BEFORE THE
SUBCOMMITTEE ON ENERGY AND POWER
HOUSE COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE

Mr. Chairman and Members of the Subcommittee:

I appreciate the opportunity to be here today to discuss the potential of alternative liquid fuels for automotive use. In addressing this subject, I will direct my remarks primarily to alcohol fuels because these fuels have high potential for replacing petroleum-derived fuels in the near-term.

We have done a substantial amount of work in the alcohol fuels area and over the past year have issued three reports on the subject. 1/ I am submitting a copy of each report for the record. Based on our work, we have determined that alcohol fuels have vast potential for replacing petroleum fuels, particularly in the automotive sector. Perhaps even more important, unlike some other synthetic fuel options which

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1/"Potential of Ethanol As A Motor Vehicle Fuel" (EMD-80-73, June 3, 1980); "Concerns Over the Department of Energy's (DOE's) Program and Organization for Developing and Promoting the Use of Alcohol Fuels" (EMD-80-88, July 22, 1980); "Conduct of DOE's Gasohol Study Group: Issues and Observations" (EMD-80-128, Sept. 30, 1980).

still require extensive R&D before commercialization can be expected, the technology to produce alcohol fuels--both ethanol and methanol--is here today. Ethanol is now making a contribution toward stretching available gasoline supplies and methanol could eventually be produced in sufficient quantity to totally replace gasoline.

Our work in the alcohol fuels area has addressed both ethanol and methanol. Concerning ethanol we found that

--there is minimal but expanding use in a blend of 10-percent ethanol and 90-percent unleaded gasoline (commonly referred to as gasohol) which is now helping to stretch gasoline supplies;

--the current selling price of ethanol is about $1.75 per gallon, but as new, more efficient distilleries are put into use, the price could decline;

--because of feedstock constraints, ethanol's potential will most likely be limited to the role of a valuable gasoline extender; and

--ethanol commercialization has benefited substantially from a waiver of Federal gasoline taxes (amounting to a subsidy of 40 cents a gallon in the form of gasohol) and even larger waivers of some State gasoline taxes.

We also examined methanol in considerable detail and from many different perspectives. Based on our work, we are highly optimistic about methanol's potential as an automotive fuel.

In discussing methanol, let me address its potential more specifically in terms of its (1) production, (2) use as an automotive fuel, (3) environmental and health characteristics, and (4) status relative to other synthetic fuel options.

METHANOL PRODUCTION

Methanol offers a synthetic fuel option with highly promising production potential that the Nation could begin implementing within existing technology. Methanol can be produced from almost any organic feedstock, including coal, natural gas, trees, and municipal solid waste. Hence, unlike ethanol, there is no shortage of available feedstock to produce methanol. Methanol is currently produced in the United States primarily from natural gas. Because of limited availability of natural gas, production of methanol for automotive fuel use is expected to be from coal. In this connection, based on Department of the Interior assessments, sufficient economically recoverable coal reserves exist to enable enough methanol production to totally replace gasoline for perhaps 100 years while still enabling almost a doubling of current domestic demand for other uses. In addition, development of in-situ processing technology could make enough additional coal reserves available to extend this production potential several times longer. Methanol production potential could be further expanded with the use of renewable feedstocks such as trees, municipal solid waste, and crop residues.

Although the same feedstocks could be used to produce ethanol, almost four times as much methanol could be produced with those same feedstocks.

Many reports on the subject of synthetic fuels development have predicted that such development will stimulate a demand for water that will virtually exhaust unused water supplies in the water-short West. Based on data available to GAO, however, water availability may not be the obstacle to energy development it is often thought to be. In this connection, GAO's January 1980 report 1/ on the availability of water for energy development in the West, concluded that sufficient water is available from Federal reservoirs to meet energy development needs, including the production of synthetic fuels, without interfering with existing water users through the year 2000. Extending this projection beyond the year 2000, recent Department of the Interior estimates of water availability in the Missouri River Basin (a region rich in coal deposits and projected for heavy energy development) show a huge reserve of uncommitted water through the year 2050.

Methanol production is also not constrained by undeveloped technology. Although currently in the United States no commercial-scale methanol from coal production plant is in

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1/"Water Supply Should Not Be An Obstacle to Meeting Energy Development Goals" (CED-80-30, Jan. 24, 1980).

operation, the technology to produce methanol has been commercial for years. Methanol was produced from coal in France in the late 1940s and in the mid-1950s, DuPont Chemical Company operated a methanol from coal plant in the United States. As cheap natural gas became available, coal was replaced as a feedstock. However, the production of methanol from coal received renewed interest after the 1973-1974 oil embargo and in 1974 the Federal Energy Administration (a predecessor agency to DOE) recognized methanol from coal technology as a near-term energy self-sufficiency option. Today, methanol can be produced with available technology using almost any quality coal. Even high sulfur coal, which presents problems for direct combustion, can be used because the sulfur is removed during methanol processing. Our work has concentrated on methanol production from coal. However, in a recent report entitled "Energy from Biological Processes", the Office of Technology Assessment concluded that methanol can probably be produced from wood with existing technology. It further stated that production from crop residues and other renewable cellulosic feedstocks needed to be demonstrated.

Production cost estimates are highly encouraging as well. While precise cost estimates are not available since no commercial methanol from coal plant is in operation today, available projections suggest that methanol from coal production

costs could be in the range of 50 cents a gallon at today's prices. Cost estimates for production from wood are somewhat higher--in the range of 65 to 75 cents a gallon. Thus, production capability at economically viable prices should not be an obstacle to a national scale methanol program.

USE AS AN AUTOMOTIVE FUEL

Methanol can be used as an automotive fuel within existing technology as well. Methanol can be used in small blending proportions in unmodified automobiles today, but problems with phase separation, vapor lock, and materials compatibility have led to the view that methanol would be optimally used in vehicles modified to adapt to, and take full advantage of, its chemical properties. The primary modifications involve increasing fuel flow and engine compression, replacing various incompatible materials, and possibly adding a system to preheat the fuel mixture to enhance combustion. Increased fuel flow and engine compression are necessary to adapt to methanol's corrosive properties. Finally, to overcome methanol's reduced cold starting capability, engineering modifications to the fuel intake system may be required. However, this may not be necessary if cold starting aids such as ethers or, in fact, even gasoline are added to the methanol.

Auto industry representatives told us the vehicle modifications necessary would be achievable on the assembly line within existing technology at relatively minor cost. They

also indicated vehicles optimized for methanol use could be available by the time the fuel is available on a widespread basis. Available performance test data on such engines is very encouraging. Testing on modified engines show significant increases in fuel efficiency. Thus, while methanol has only about one-half the energy content of gasoline, methanol optimized engines should yield significantly more than one-half as many miles per gallon. At today's costs for gasoline and projected costs for methanol, this efficiency gain could result in lower fuel costs per mile. Testing also has shown methanol to provide increased power and lower risk of vapor lock than existing gasoline engines. Finally, based on limited discussions with Environmental Protection Agency staff, their preliminary thinking is that methanol marketing as a straight fuel in redesigned vehicles will not be constrained by restrictions on new fuels set forth in the Clean Air Act.

ENVIRONMENTAL AND HEALTH CHARACTERISTICS

In terms of its environmental and health characteristics, straight methanol is also possibly superior to gasoline. Engine tests show straight methanol produces generally lower regulated exhaust emissions, especially nitrogen oxide. In addition, since methanol does not contain aromatic hydrocarbons (such as benzene) which are used in gasoline to boost octane, its evaporative and unburned fuel emissions are

probably less toxic and possibly pose less of a carcinogenic risk. Methanol combustion does result in increased unregulated aldehyde emissions but these emissions are thought to be easily controlled with catalytic converters.

In terms of protecting water quality, methanol is also possibly more environmentally benign. Unlike petroleum products, it is completely soluble in water and does not cause lasting damage to aquatic life in the event of a spill. From the standpoint of human health, methanol is probably less toxic to breathe and more toxic to drink. Steps, such as addition of an unpleasant smell to the fuel, will be necessary to prevent the fuel from being ingested as drinking alcohol.

STATUS RELATIVE TO OTHER SYNTHETIC FUELS

Compared to other commonly discussed synthetic fuel options, such as direct liquefaction of coal, methanol has a number of distinct advantages. Perhaps most importantly, the technology to begin producing methanol from coal is here today. As we pointed out in our August 1980 Report to the Congress on coal liquefaction, 1/ further R&D is needed on direct liquefaction and it is unlikely that any commercial plants employing such technology will be operating in the 1980s. On the other hand, as I indicated earlier, methanol production

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1/"Liquefying Coal for Future Energy Needs" (EMD-80-84, Aug. 12, 1980).

technology is commercially available. Methanol has a number of other advantages as well. It offers the opportunity to utilize coal not recoverable for direct liquefaction purposes and the potential for transitioning to other renewable feedstocks. Also, in engines optimized for its use, it will likely burn more efficiently.

OBSTACLES TO METHANOL USE

While methanol has vast potential and many advantages relative to other options, our optimism about methanol as a fuel must be tempered with several realities. Neither methanol from coal nor vehicles optimized for its use are being domestically produced today. Further, no infrastructure exists for distributing methanol from its production source to points of sale. The problem of simultaneously converting both the auto and automotive fuel industries will not be easily overcome. As a step toward solving this problem, however, it may be possible to provide a market for early methanol production by using the methanol as a gas turbine fuel for generating electricity. Available testing shows methanol burns cleanly and efficiently in this capacity. Another early step might be the use of methanol in captive vehicle fleets, such as the Federal fleet, to provide a demonstration medium and early market for optimized methanol vehicles.

Another issue, common to other synthetic fuel options, is the question of environmental impacts resulting from greatly

expanded coal production. If all the Nation's gasoline were to be replaced with methanol made from coal, coal production would have to more than double from its current level and much opposition to such increased mining exists. Plant siting could also pose problems. Further, the long-term effects on atmospheric carbon dioxide levels will have to be assessed. A balance of fuel needs versus environmental concerns will have to be struck before a nationwide methanol program can be expected.

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In summary, with methanol the Nation has a synthetic fuel option that it can potentially begin producing and using with existing technology at competitive costs. In addition, compared to gasoline, numerous studies have shown that methanol has generally favorable environmental characteristics. While methanol's potential is vast, several important obstacles remain to be resolved before its widespread use can become a reality.

Mr. Chairman, that concludes my prepared statement. We would be pleased to answer any questions at this time.