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Briefing Report to the Chairman,
Subcommittee on Energy and Power,
Committee on Energy and Commerce,
House of Representatives

October 1987

ALTERNATIVE FUELS

Information on DOE's Methanol Vehicle Demonstration Program



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United States
General Accounting Office
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Resources, Community, and
Economic Development Division

B-226783

October 7, 1987

The Honorable Philip R. Sharp
Chairman, Subcommittee on
Energy and Power
Committee on Energy and Commerce
House of Representatives

Dear Mr. Chairman:

This briefing report is the second of two reports responding to your February 5, 1986, request for information on the status of federal methanol vehicle demonstration programs. On May 22, 1987, we issued a report on the Department of the Army's progress toward achieving the goals of the Department of Defense (DOD) program entitled Alternative Fuels: Information on DOD's Methanol Vehicle Program (GAO/RCED-87-91).

This briefing report presents information we provided to your staff during a July 28, 1987, briefing on the status of the Department of Energy (DOE) program, which was begun in October 1984 to introduce methanol vehicles into the civilian federal fleet. Specifically, this report discusses why other federal agencies have not participated in the program, DOE's experience in acquiring and operating demonstration fleets, coordination between the DOE and DOD programs, and a recent initiative to acquire flexible-fueled vehicles that can operate on gasoline, methanol, or a combination of both fuels.

In summary, we found that:

- Although DOE informed other civilian federal agencies about the goals, objectives, and requirements of the methanol vehicle demonstration program, other agencies have not participated for a number of reasons. According to program managers, federal agencies (1) did not want to purchase the number or type of vehicles that DOE required, (2) were concerned about methanol fuel availability and the reliability of methanol-fueled vehicles, and (3) did not want to be burdened with data

collection and other program requirements. DOE program management officials told us that DOE has essentially given up its efforts to bring other federal agencies into its program.

- DOE experienced delays in establishing its three demonstration fleets. As of June 30, 1987, two methanol demonstration fleets were in operation at DOE facilities (10 vehicles at one national laboratory and 19 vehicles at another). DOE started operating part of a third small fleet in July 1987. DOE has gained experience in operating methanol-fueled vehicles, but this effort contributed little to increasing the federal and commercial use of methanol fuel and vehicles.
- The DOE and DOD methanol demonstration programs were closely coordinated in the early stages through monthly meetings. Although these meetings were discontinued after July 1985, the two agencies continued to exchange monthly reports on the status of their programs and to maintain informal contact.
- The President's Task Force on Regulatory Relief announced in July 1987 that it would ask the General Services Administration (GSA) to issue a request for proposals in 1988 for the purchase of 5,000 flexible-fueled vehicles. According to DOE, GSA, and the Office of Management and Budget (OMB), any decision to purchase such vehicles for federal fleets would depend on the costs, warranties, and other information submitted by vehicle manufacturers. They said that DOE's role would probably be to provide technical assistance and advice.

To obtain information for this report, we interviewed DOE program management officials, DOE program operation personnel at fleet locations, GSA officials responsible for procurement of federal fleet vehicles, and OMB officials. We also reviewed pertinent DOE and GSA reports, records, and other documents on the program and fleet operations. Our information was gathered between November 1986 and July 1987.

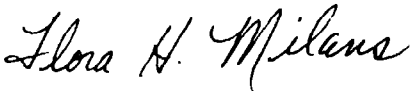
We discussed the contents of this report with DOL officials, and they agreed with our presentation of the facts. We made clarifications, on the basis of these discussions, where appropriate. Our work was performed in accordance with generally accepted government auditing standards.

B-226783

As agreed with your office, we are sending copies of this report to the Secretary of Energy and to other interested parties. Please call me at (202) 275-8545 if you have any questions about this briefing report.

Major contributors to this report are listed in appendix I.

Sincerely yours,

A handwritten signature in cursive script that reads "Flora H. Milans".

Flora H. Milans
Associate Director

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ABBREVIATIONS

DOD	Department of Defense
DOE	Department of Energy
GAO	General Accounting Office
GSA	General Services Administration
OMB	Office of Management and Budget

SECTION 1

BACKGROUND

DOE established a methanol vehicle demonstration program because of congressional interest in introducing methanol vehicles into the civilian federal fleet and obtaining data on their performance, operation, and cost. The program was to encourage increased methanol use by stimulating the commercial readiness of methanol-fueled vehicles.

The fiscal year 1985 Continuing Resolution (H.J. Res. 648, which was signed on Oct. 12, 1984), appropriated \$980,000 in DOE's budget for implementing the program. House reports stipulated that the program should be closely coordinated with a similar program to be conducted by DOD and should be carried out in accordance with section 105 of House bill 5048. Although this bill did not pass, DOE consulted with congressional sources and decided to use the provisions of section 105 as congressional guidance for implementing its methanol vehicle demonstration program.

DOE'S METHANOL VEHICLE PROGRAM PLAN

In April 1985, DOE published a program plan which set forth the goals and strategy for implementing the program in a two-phased approach. During phase I, a limited number of late-model gasoline vehicles were to be retrofitted to operate on methanol fuel. They were to be paired with a similar number of gasoline-fueled vehicles in participating federal fleets to obtain comparison data on normal and cold weather performance; fuel economy, safety, and emissions; and operations and maintenance costs. During phase II, up to 1,000 methanol vehicles were to be purchased from original equipment manufacturers (using GSA purchase and allocation policies) and integrated into federal fleets.

The program's goal was to introduce and assimilate methanol-fueled vehicles within the federal fleet in a manner common to, and consistent with, the present use of gasoline-fueled vehicles. DOE hoped that this, in turn, would encourage industry to commercialize methanol vehicles. The plan indicated that a structured methanol-fueled vehicle project would be utilized as part of federal fleet operations to accomplish this goal. At the same time, industry and the public would be given accurate operational, reliability, and economic data for expediting market decisions on the (1) introduction of production methanol vehicles by the automotive industry, (2) purchase of methanol vehicles by fleet operators and the public, (3) development of a viable fuel supply industry, and (4) establishment of a methanol fuel distribution system.

DOE planned to place the vehicles in various federal agencies to demonstrate to fleet management personnel that replacing gasoline vehicles with methanol vehicles would work well and not cause any major difficulties. DOE initially expected phase I of the program to be completed in fiscal year 1986 in time for the fiscal year 1987 federal vehicle procurement. However, DOE officials told us in July 1987 that they could not estimate when phase I would be completed and were uncertain of whether or when phase II would be undertaken. They said that the \$980,000 appropriation had been expended or committed and DOE had received an additional \$220,000 in fiscal year 1987 to continue collecting and analyzing data on its methanol demonstration fleets. DOE also requested \$300,000 in its fiscal year 1988 budget for this purpose.

GSA'S ROLE IN THE PROGRAM

GSA is responsible for the centralized purchase of vehicles for civilian and military agencies and providing fleet management assistance. GSA solicits bids for vehicles, reviews the bids, and awards the contracts.

In April 1985, GSA and DOE entered into an interagency agreement whereby GSA would procure or lease the vehicles that were to be used in the methanol demonstration program unless other arrangements could be made. The agency requesting the vehicles was to pay for the basic cost, and DOE was to pay for the incremental cost of converting the gasoline-powered vehicles to operate on methanol fuel and arrange for any fuel storage and dispensing equipment that might be needed.

SECTION 2

OTHER FEDERAL AGENCIES HAVE NOT PARTICIPATED IN THE METHANOL VEHICLE PROGRAM

DOE has made little progress in meeting the program goal of introducing methanol-powered vehicles within the federal fleet. Other federal agencies have not participated in the program for several reasons as discussed below.

DOE'S EFFORTS TO ENCOURAGE PARTICIPATION

According to DOE program management officials, DOE spent considerable time and effort in acquainting other civilian federal agencies with the program's goals, objectives, and requirements and encouraging them to participate. They said that DOE sent letters to about 20 federal agencies that had vehicle fleets explaining the program and offering to meet with them to discuss the details on participation. They also visited the agencies that indicated an interest in the program and made formal presentations, provided copies of questions and answers about program participation, and followed up with telephone calls.

REASONS WHY FEDERAL AGENCIES HAVE NOT PARTICIPATED

According to program managers, many federal fleet managers were reluctant to participate in the program because DOE wanted them to include at least five methanol-powered vehicles and five gasoline-powered control vehicles of the same model in their fleets in order to obtain sufficient comparative operating and performance data. They said that fleet managers did not want to add so many vehicles because their overall fleet sizes were limited by budgetary constraints and they did not want to have to give up fleet vehicles to make room for the demonstration vehicles. We were told that budget cuts had also forced some fleet managers to reduce the size of their fleets.

The program managers said that fleet managers particularly did not want to give up gasoline-powered vehicles of known dependability (which could be refueled anywhere) for methanol-powered vehicles of lesser known dependability (which could only be refueled where methanol would be available). For example, we were told that a federal agency in California that was interested in the program and needed at least 10 vehicles decided not to participate because of the limited driving range of methanol vehicles (compared with gasoline vehicles) and the limited methanol refueling facilities.

DOE wanted to use four vehicle models for its demonstration program (Chevrolet Citations, Chevrolet S-10 pickup trucks, Ford Crown Victorias, and General Motors Buick Regals) because their engines had previously been converted and tested for methanol use by the Bank of America, California Energy Commission, or the vehicle manufacturers. Program managers said that some fleet managers did not want these vehicle models. Others were concerned about cold start and warm-up driveability of methanol vehicles and whether they would fit in with their mission to supply dependable transportation upon demand, particularly for long trips.

Program managers said that some fleet management personnel also did not want to be burdened with the additional responsibilities required under the demonstration program of familiarizing drivers with operating methanol vehicles, collecting operating and performance data, and training fleet mechanics to work on methanol vehicles. Others were concerned about installing and maintaining expensive methanol refueling facilities for the small number of vehicles that would be using the facilities.

DOE program management officials told us in July 1987 that DOE had essentially given up its efforts to encourage other civilian federal agencies to purchase methanol vehicles under the program. They said that DOE would continue to collect and analyze data on its own methanol vehicle fleets.

SECTION 3

STATUS OF DOE'S DEMONSTRATION FLEETS

DOE experienced delays and technical and administrative impediments in establishing its three demonstration fleets. Further, this effort contributed little to increasing the use of methanol fuel and vehicles.

DOE was not able to acquire manufactured methanol vehicles because original equipment manufacturers were not interested in producing new methanol vehicles in small quantities. Therefore, gasoline vehicles were acquired and modified to operate on methanol.

The cost of one of the demonstration vehicles (the General Motors turbocharged Buick Regal) exceeded the statutory price limitation for federal fleet vehicles. As a result, DOE worked out an arrangement to lease 10 of the vehicles to begin operation at its Oak Ridge National Laboratory in July 1987.

Table 3.1 shows the composition and location of vehicles in DOE's methanol vehicle demonstration program as of June 30, 1987.

Table 3.1: DOE Methanol Vehicle Fleet

<u>Location</u>	<u>Type of vehicle</u>	<u>Methanol</u>	<u>Gasoline^a</u>
California:			
Lawrence Berkeley Laboratory	1984 Chevrolet Citation	5	5
Illinois:			
Argonne National Laboratory	1986 Ford Crown Victoria	5	4
	1986 Chevrolet S-10 pickup truck	<u>5</u>	<u>5</u>
Total		<u>15</u>	<u>14</u>

^aThe gasoline vehicles were used as control vehicles to provide a source of comparison with the methanol vehicles.

LAWRENCE BERKELFY LABORATORY FLEET

DOE began operating a methanol vehicle demonstration fleet at its Lawrence Berkeley Laboratory in early November 1985. It consisted of (1) five 1984 Chevrolet Citations that DOE owned and had the Bank of America, which operates a fleet of methanol vehicles, modify to operate on methanol fuel and (2) five 1984 gasoline-powered Citations that DOE leased from GSA to use as a control group for comparison. The 10 vehicles were placed in the central motor pool to serve some of the transportation needs of laboratory personnel on a reserve/dispatch basis. The laboratory also leased a 2,000-gallon methanol fuel tank and pump and installed them at its motor pool garage facilities.

Fleet managers said that the vehicles have been used for a wide variety of driving missions by many employees, including trips around the laboratory site and within the Berkeley and Oakland, California, area. According to fleet managers, drivers' perceptions have been positive toward the methanol vehicles, and they have not needed any major repairs. Also, refueling has not been a problem because of the methanol fueling facilities at the laboratory and Bank of America fueling stations in the San Francisco Bay area.

A program management report on the results of the demonstration fleet's first year of operation indicated that the methanol and gasoline vehicles had accumulated about 37,000 and 74,000 miles, respectively, without serious disruptions in service. The methanol vehicles averaged about 36 miles per trip, and the gasoline vehicles averaged about 57 miles per trip. Only the gasoline vehicles were used on long, overnight trips.

The report also indicated that project start-up difficulties were minimal, and levels of maintenance required by both methanol and gasoline vehicles were reasonable. Although drivers had expressed some early concern regarding off-site availability of methanol fuel, they generally reported no significant differences in their perceptions of safety and operability (ease of starting and driveability) between methanol and gasoline vehicles. The report stated, however, that the methanol vehicles had experienced about 10 percent less efficiency in fuel economy on an energy content basis than the gasoline vehicles. Also, oil sample analyses showed that the methanol vehicles had higher engine wear rates.

ARGONNE NATIONAL LABORATORY FLEET

DOE selected its Argonne National Laboratory as its cold weather test site and began operating a demonstration fleet at the laboratory in August 1986 when five gasoline-powered Chevrolet S-10 pickup trucks were delivered. Four gasoline-powered Ford Crown Victorias were added to the demonstration fleet in October 1986, followed by five methanol-converted Chevrolet S-10 pickup trucks in November 1986, and five methanol-converted Crown Victorias in December 1986. The methanol conversions were performed by Alcohol Energy Systems. Fleet managers told us that they wanted to begin the demonstration project several months earlier but experienced delays in obtaining the 19 vehicles. They also experienced delays in the installation of a 6,000-gallon methanol fuel tank at the laboratory and a cold weather start system for the methanol vehicles.

The Chevrolet S-10 pickup trucks were dispersed around the laboratory to several different departments and used for maintenance service purposes, trips around the laboratory, and business trips to Chicago. The Ford Crown Victorias were used as security patrol vehicles and for driving guards back and forth to the main gate. Fleet managers said that drivers' perceptions of the methanol-powered vehicles have generally been positive and refueling has not been a problem because of the methanol fuel tank on the premises.

According to fleet managers, the methanol-powered Chevrolet S-10 pickup trucks have been operating fairly well, and the few problems that did occur were relatively minor. However, fleet managers have experienced problems with the five methanol-powered Ford Crown Victorias since March 1987. Fuel injectors have continued to plug and have needed to be replaced about every 2,000 to 4,000 miles. The cause of the problem in the fuel system has not been determined. Also, one of these vehicles had major engine damage when heat melted a hole through one piston and started to melt through another. The pistons were replaced and the cylinders refinished. Fleet managers said that the wrong types of rings and spark plugs had been installed in the Crown Victorias when the engines were modified to operate on methanol fuel. They have replaced the spark plugs in the other vehicles, but do not intend to tear down the engines to replace the rings unless it becomes necessary.

DOE officials told us that they had not made any statistical analysis of the results of the Argonne demonstration fleet operations because the fleet had not operated long enough to obtain sufficient data. They said a report would be prepared after the fleet has been in operation for 1 year.

OAK RIDGE NATIONAL LABORATORY FLEET

DOE has been attempting to organize a demonstration fleet at its Oak Ridge National Laboratory since late 1985. It will consist of five methanol-fueled and five gasoline-fueled turbocharged Buick Regals. The methanol conversions are being done by Michigan Automotive Research Corporation. The gasoline vehicles were delivered to the laboratory in July 1987, and DOE expects the methanol-fueled vehicles to be available by September or October 1987. The 10 vehicles will be leased from a local Buick dealer for a 3-year period and used to provide transportation for laboratory personnel around the premises and within the Knoxville, Tennessee, area. According to DOE, the vehicles had to be leased rather than purchased because their cost exceeded the statutory price limitation for federal vehicles.

IMPACT OF PROGRAM ON INCREASED USE OF METHANOL FUEL AND VEHICLES

Although the DOE demonstration program should provide some useful data on the operation, maintenance, and emissions of methanol vehicles, the program has done little to (1) encourage increased use of methanol fuel and vehicles within the federal fleet or (2) promote the commercial production of methanol vehicles and distribution of methanol fuel. Even if interest among other federal agencies in using methanol vehicles was greater, a previous GAO report concluded that converting the federal fleet to operate on methanol was unlikely to provide sufficient demand for vehicles or fuel to promote commercial production and distribution.¹

According to program managers, the demonstration has had good cooperation and support from the private sector, including gasoline pump dealers, oil companies, and others involved even though they had little incentive except the desire to see the program succeed in the long run. Program managers agreed that without incentives to make the methanol vehicles more attractive for federal fleet managers, few would be willing to take the risks that come with the uncertainty.

¹See Removing Barriers to the Market Penetration of Methanol Fuels (GAO/RCED-84-36, Oct. 27, 1983).

SECTION 4

INTERAGENCY COORDINATION BETWEEN DOE'S AND DOD'S METHANOL VEHICLE DEMONSTRATION PROGRAMS

A DOE program management official told us that from October 1984 to July 1985, DOE and DOD met monthly and exchanged information on the status and commonalities of the two methanol vehicle demonstration programs and their plans for acquiring and using test vehicles. These early discussions focused on how the programs would be organized and operated and what kind of data would be collected. The two agencies also exchanged monthly status reports on their programs and kept in touch by telephone. He mentioned that during a telephone discussion, DOE informed DOD of the availability of a number of factory-built, methanol-powered Ford Escorts that were being sold by the state of California, and DOD subsequently purchased 25 of the vehicles. These vehicles had previously been used in the California Energy Commission's methanol vehicle demonstration program.

According to the DOE program management official, after July 1985 the two agencies discontinued holding periodic meetings to discuss the programs, but continued to exchange monthly status reports and to coordinate their efforts by telephone. He said that by that time, the programs were far enough underway that the correspondence and telephone calls satisfied their informational needs.

SECTION 5

RECENT INITIATIVE TO ACQUIRE FLEXIBLE-FUELED VEHICLES

Several federal efforts are underway to improve the nation's air quality levels by promoting the use of alternative vehicle fuels that release lower levels of pollutants than gasoline. GSA is considering a proposal to purchase 5,000 flexible-fueled motor vehicles which can operate on gasoline, methanol, or a combination of both fuels. DOE is also attempting to lease one or two flexible-fueled vehicles for use by federal agencies.

PRESIDENT'S TASK FORCE PROPOSAL

The President's Task Force on Regulatory Relief announced on July 14, 1987, that it had completed its review of the potential role of alternative fuels (such as methanol, ethanol, and compressed natural gas) in meeting the nation's air quality goals. An interagency working group, which had been formed after a Task Force meeting on April 9, 1987, to assess the potential of alternative fuels and to identify measures that would facilitate the use of such fuels, recommended, among other things, that GSA issue a request for proposals early next year for the purchase of at least 5,000 flexible-fueled motor vehicles.

We discussed this recommendation with DOE, GSA, and OMB officials and were told that, although a request for proposals for the flexible-fueled vehicles would likely be issued by GSA, any decision on whether or not to purchase such vehicles would be based on an analysis of the costs, warranties, and other information included in the responses from vehicle manufacturers. They said that if the vehicles were ultimately purchased, they would become part of GSA's federal fleet and would be leased to federal agencies as replacement vehicles. Although DOE's role has not been specifically defined, the officials indicated that DOE would probably be asked to provide technical assistance and advice where needed in developing vehicle specifications and operating methanol-fueled vehicle fleets.

DOE'S EFFORTS TO LEASE FLEXIBLE-FUELED VEHICLES

DOE planned to begin operating one or two flexible-fueled Ford Crown Victorias in the Washington, D.C., area in the spring of 1986. DOE wanted to lease the vehicles for a 1- or 2-year period from the Ford Motor Company and loan them on a rotating short-term basis to various federal agencies for executive use. To provide for refueling, DOE planned to obtain one or two light-duty pickup trucks modified to store and dispense methanol fuel.

Although several federal agencies had advised DOE of their interest in using a flexible-fueled vehicle and had agreed to provide the required performance data, neither DOE nor GSA has been able to lease the vehicles from the Ford Motor Company because of unresolved legal issues concerning insurance liability. According to a GSA official, the Ford Motor Company requested that the government purchase insurance on the leased vehicles, but GSA would not agree to this because the government self-insures its motor vehicles. Ford also requested that the government indemnify it for any damages that might result from the vehicles, but GSA would not agree to this because the account funding the potential lease of these vehicles would be inadequate for indemnification purposes. DOE and GSA officials said they could not estimate when or if the vehicles would be available.

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