

AFDC UPDATE

News of the Alternative Fuels Data Center

Number of AFVs in Federal Fleet Expands Significantly

The number of alternative fuel vehicles (AFVs) being placed in service in the federal fleet under the Alternative Motor Fuels Act of 1988 (AMFA) has grown significantly from 65 AFVs in 1991 to an anticipated total of 3,267 light-duty AFVs in 1992 through the efforts of the U.S. Department of Energy and the General Services Administration.

The greatly expanded 1992 program includes 2,565 fuel-flexible vehicles designed to run on M85 (85% methanol/15% unleaded gasoline), 25 that run on E85 (85% ethanol/15% unleaded gasoline), and 677 that run on compressed natural gas (CNG). These vehicles are being placed in

fleets operated by 24 federal agencies, with priority given to locations that are in nonattainment of federal clean air regulations and that have a sufficient refueling infrastructure.

Operating data will be collected from slightly more than 20%, or 665, vehicles—almost 600 more than last year. The AFVs added to the data collection program in 1992 will include 75 Chrysler CNG full-size vans, 25 GM Lumina ethanol fuel-flexible sedans, and 250 Chevrolet C-20 CNG pickup trucks in addition to fuel flexible M85 vehicles. Figure 1 shows the areas where these AFVs are placed in this fiscal year.

Conventionally fueled control and fuel-flexible vehicles placed in the AMFA program in four cities over the period January 1991 through July 1992 accumulated nearly 900,000 miles, or an average of 10,612 and 12,521 miles per vehicle for M85 non-control and gasoline-powered control vehicles, respectively.

The fuel-flexible vehicles, running primarily on M85, averaged 12.7 to 16.8 miles per gallon (mpg) (M85 has only a little over 50 percent of the energy content per gallon of gasoline). Gasoline-powered control vehicles in the four cities got between 21.1 and 23.1 mpg.

Laboratory exhaust and evaporative emission levels were also measured in 1991. Initial results indicated that the AMFA vehicles tested exceed federal light-duty vehicle standards for all emissions. □

(see map on page 2)

First U.S. Ethanol Bus Program Begins; DOE Plans Data Collection

In a cooperative venture, the Greater Peoria Metropolitan Transit District (GPMTD), Federal Transit Authority, Illinois Department of Natural Resources, U.S. Department of Energy, Detroit Diesel Corporation, Archer Daniels Midland and others began the first ethanol transit bus program in the United States in October.

Fourteen of GPMTD's 49-bus transit fleet will run on E95 (95% ethanol/5% unleaded gasoline denaturant).

The U.S. Department of Energy (DOE) will sponsor an extensive data collection effort, the results of which will be contained in the Alternative Fuels Data Center at the National Renewable Energy Laboratory. This effort will include testing by the DOE/University of West Virginia Portable Heavy-Duty Chassis Dynamometer facility. Emissions from the ethanol engines and a control diesel engine will be monitored for carbon monoxide, carbon dioxide, nitrogen oxides, total hydrocarbons, and aldehyde levels.

The ethanol buses are equipped with DDC 6V-92TA engines (electronically controlled, 253 horsepower). The E95-fueled engines have special modifications to the electronic control systems, fuel injectors and glow

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FY 93 AMFA Data Collection Demonstration Vehicles

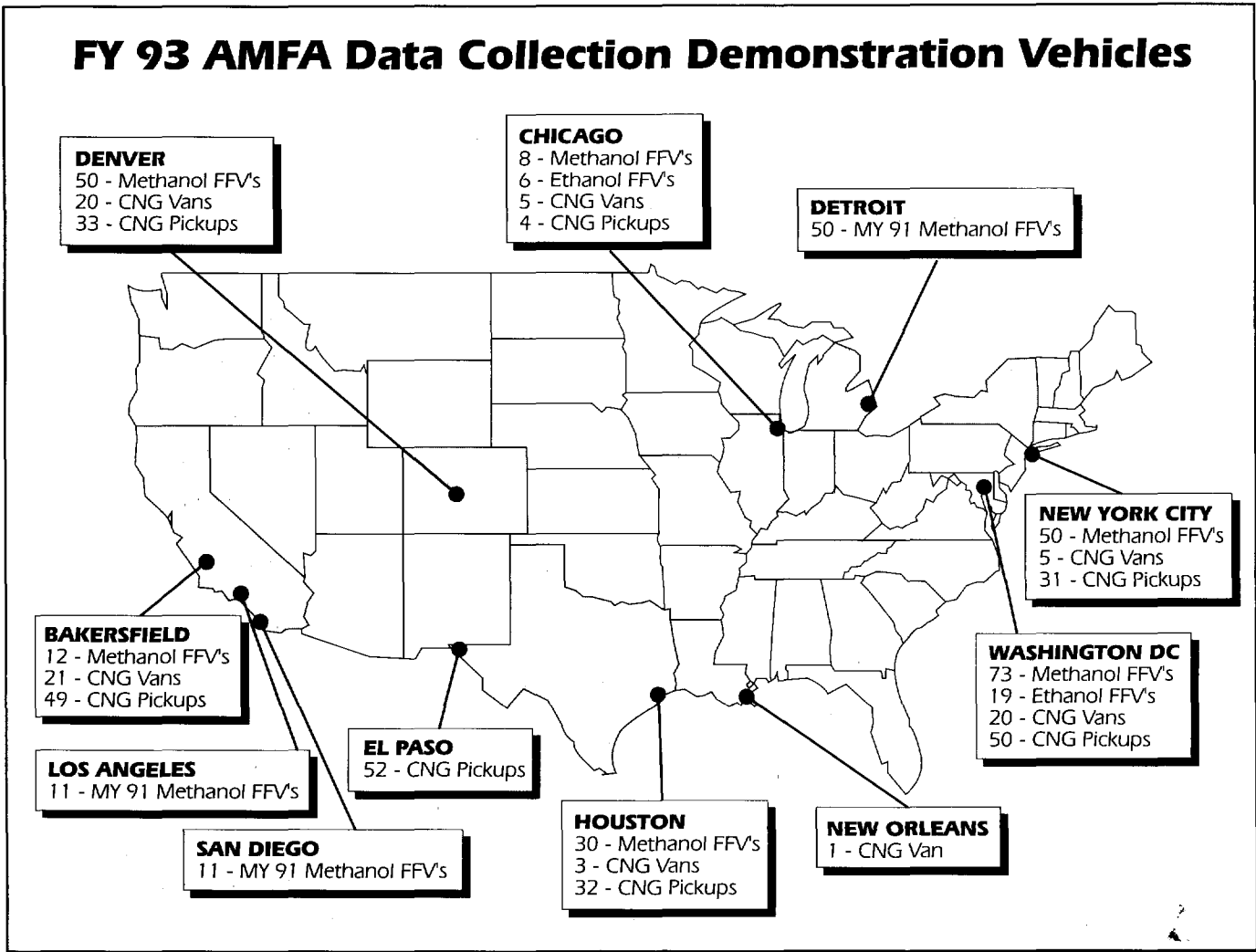


Figure 1.

First U.S. Ethanol Bus Program Begins *(continued from page 1)*

plugs. These bus engines exceed the 1994 U.S. Environmental Protection Agency standards for urban bus engines (see *AFDC Update*, August 1992, p. 1).

The 14 new E95-fuel transit buses will replace conventional diesel-engine buses at a cost of \$247,000 per vehicle, versus the normal \$210,000 to \$225,000 for a 35-foot, 96-inch wide coach. The buses, built by Transportation Manufacturing Corporation of Roswell, NM, were modified to include automatic fire-sensing and suppression systems, and larger fuel tanks. □



Ethanol bus placed in Peoria, IL transit fleet.

New Study: CNG and LPG Retrofits Potentially Clean, Economical, Safe

In-use performance and emissions of aftermarket fuel delivery systems (AFDS) for compressed natural gas (CNG) and liquefied petroleum gas (LPG) vary widely. However, a study sponsored by the U.S. Department of Energy's Office of Alternative Fuels through the National Renewable Energy Laboratory (NREL) concludes that these systems have the potential for clean, economical, and safe operation in the future.

"Evaluation of Aftermarket Fuel Delivery Systems for Natural Gas and LPG Vehicles," published in September 1992, was conducted by Dr. Bryan Willson of Colorado State University's Engine and Energy Conversion Laboratory.

Willson's research included an extensive literature review and direct contact with AFDS manufacturers, as well as a first-hand study of CNG and LPG conversions at the engine laboratory.

The study draws conclusions about the current state of AFDS technology, with some suggestions about its future evolution. For example, in-use technology employs mechanical systems that will soon be replaced by state-of-the-art setups that include oxygen feedback and sophisticated computerized sensors and controls, which will help to lower emissions and enhance performance.

Current information indicates that the fuel composition of LPG and CNG is variable, as are emissions of vehicles that run on either fuel. Few in-use emissions data are available, but light-duty CNG and LPG-converted vehicles with advanced technology exhibit lower emissions of carbon monoxide and nonmethane hydrocarbons than do vehicles running on conventional fuels. Information on nitrogen oxide levels is inconclusive.

Medium-duty and heavy-duty AFDS technologies were evaluated, with the conclusion that "a significant need exists for more high-quality equipment for diesel conversions."

The study finds that "the safety of converted vehicles is strongly related to the quality of workmanship of the conversion." On fuel cylinder integrity, the report noted that a worldwide search could not find a single instance of a U.S. Department of Transportation (DOT)-approved cylinder failing in a CNG vehicle application. "Although the industry has focused on the impregnability of high-pressure tanks (both CNG and LPG), the gas lines, hoses, and valves remain the weak links in an accident."

On AFDS performance, Willson found that in-use data showed that CNG-converted vehicles exhibited some engine power loss due to restrictions in air and fuel flow to the engine

imposed by the conversion equipment.

The further development of CNG and LPG vehicle conversion technology is seen as important not only as a bridge to encourage the development of a refueling infrastructure, but also as an important step in the development of technology that ultimately will be used by original equipment manufacturers. □

New York City Inaugurates New CNG Packer Trucks

At a ceremony that included New York City Mayor David N. Dinkins, the City's Department of Sanitation launched the nation's first fleet of compressed natural gas (CNG)-powered packer trucks.

The six data-logger-equipped trucks were put into regular trash collection service on October 1. The

(continued on page 4)



CNG packer truck makes rounds in New York City.

New York City Inaugurates

(continued from page 3)

National Renewable Energy Laboratory will collect data on emissions, fuel consumption, performance, and durability as part of a 7.5-year study. The data will be contained in the Alternative Fuels Data Center.

The trucks use Cummins L10 engines. The incremental cost of purchasing these trucks was covered by the U.S. Department of Energy. Fuel for the CNG trucks is 30% less expensive than standard diesel fuel, according to a city official.

Other funding and development participants include Brooklyn Union Gas, Consolidated Edison, Cummins Engine Company, and Crane Carrier Company.

The packer trucks are part of a fleet being developed throughout New York City by a multi-agency Alternative Fuels Task Force.

The Department of Sanitation began its alternative-fuels program in 1988 with three CNG passenger cars and three pickup trucks. The country's first CNG collection truck joined the fleet in 1989. The department's alternative-fuel fleet now consists of 117 vehicles—106 CNG passenger cars and light trucks, seven CNG-powered trucks, one methanol-powered collection truck, and three methanol passenger cars. □

Federal Agencies Ready to Change Fleets to Alternative Fuels

U.S. Department Of Energy Spearheads National Effort

Federal agencies have shown an enthusiastic response to a U.S. Department of Energy (DOE) survey asking about their intentions to purchase or convert to alternative-fuel vehicles over the next five years.

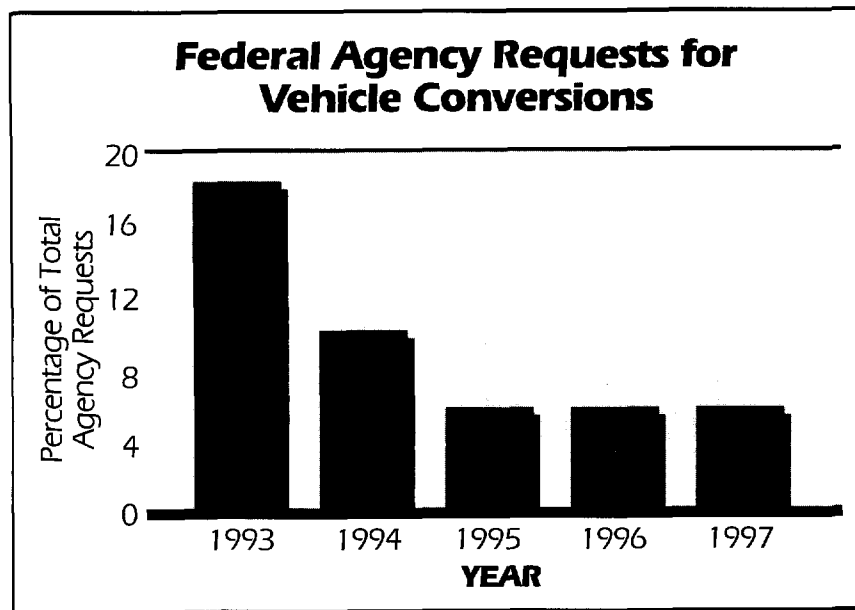


Figure 2.

Sixty percent of the 47,325 alternative-fuel vehicles (AFVs) requested by federal agencies under the five-year plan are fuel-flexible vehicles (FFVs), operating on alcohols and/or gasoline, while 36% will run on natural gas, DOE officials say. More than 5,700 AFVs have been requested for 1993.

Agencies requested 20% of the alcohol and natural gas vehicles (NGVs) be conversions of existing vehicles in FY1993. Of the conversions, 76% of the vehicles requested are NGVs and 14% are for alcohol fuels. DOE officials said alcohol-fuel conversions will not be needed, given the availability of original equipment manufacturer (OEM)-proven technology.

The agencies' purchasing plans were made available through DOE's Office of Alternative Fuels, which is responsible for implementing Executive Order 12759. Signed by President Bush in 1991, the order requires federal agencies to introduce the maximum practical number of AFVs.

The General Services Administration (GSA) has worked closely with DOE and the agencies during preparation of the 5-year plan, and on September 15, 1992 issued a request for

proposal (RFP) for the purchase of AFVs.

To address conversion demand, DOE has established draft guidelines to provide a basis for evaluating possible conversion programs. These guidelines will provide a structure for federal fleets and others to compare conversion equipment, fuel, and operating costs, as well as other pertinent issues.

Federal agency fleet conversions will be facilitated by the National Renewable Energy Laboratory (NREL). In the fourth quarter of 1992, NREL issued an RFP to perform vehicle conversions and supply fuel to a number of federal vehicles. DOE officials expect to announce the awards by February 1993. To obtain more information about the RFP, fax your request to 303-231-1343. Include your name, address, and refer to synopsis number 2-206.

DOE is open to different pricing strategies for the proposed fuel supply and conversion contracts. "Ideally, we would like to see a subcontractor subsidize the conversion and refueling facilities in return for a commitment that the converted vehicles would refuel at a negotiated fuel price over a

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Federal Agencies Ready to Change *(continued from page 4)*

three-year period. However, several alternate strategies exist which we will consider," said one DOE official.

Although many agencies are willing to convert their vehicles to meet the procurement plans, they prefer vehicles from OEMs. Of the vehicles requested, alcohol-fuel compact cars and light-duty trucks are favored. This demand could be met

through the purchase of OEM-produced fuel-flexible vehicles.

The quantitative results of the plan will be made available through the Alternative Fuels Data Center (AFDC) at NREL or the National Alternative Fuels Hotline at 1-800-423-1DOE.

Legislation recently passed by Congress modifies and expands the federal fleet program (see related story this issue).

Similar data on AFV purchases for state governments are being collected in a cooperative effort sponsored by DOE regional support offices. The results have been shared with automakers, alternative-fuel trade groups, and others who will supply fuels and vehicles. Aggregated federal and state AFV requirements will provide a strong market signal to automakers and fuel suppliers. □

Locations of Federal Agencies requests for Alternative Fuel Vehicles

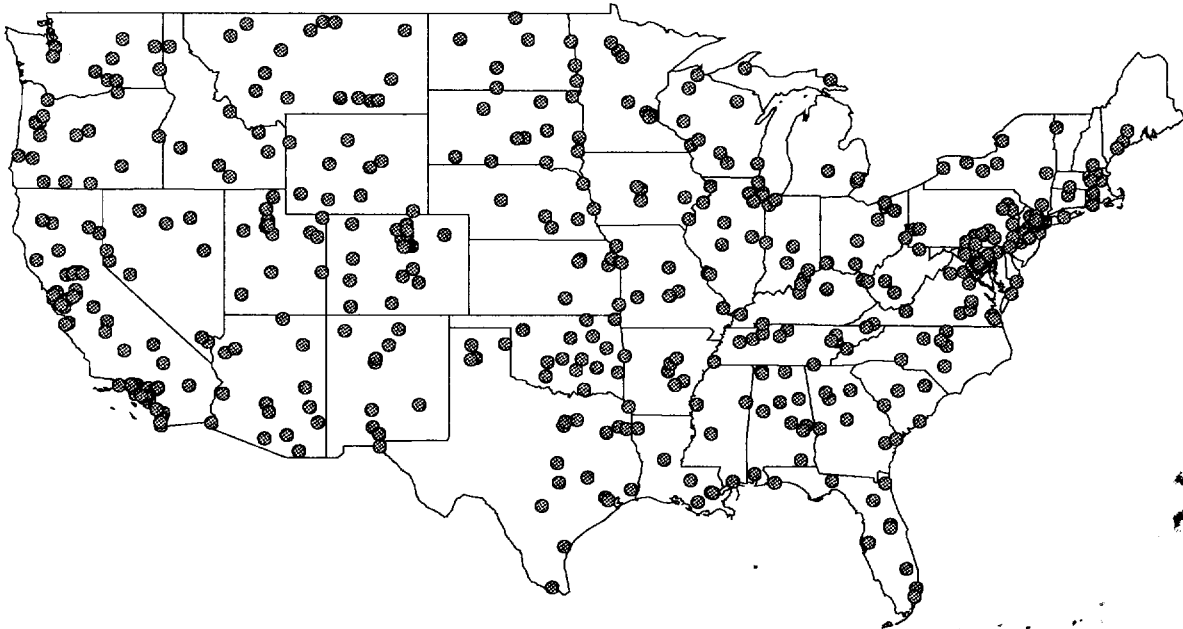


Figure 3.

DOE Moves Forward With Heavy-Duty Alternative-Fuel Demonstration Program

Eleven Grants Awarded For School Buses

The U.S. Department of Energy's (DOE's) Office of Alternative Fuels announced awards totaling \$743,505 for grants to 10 states and the District of Columbia for the purchase of about 45 alternative-fuel school buses. One

fleet will be fueled by methanol and the rest will operate on compressed natural gas (CNG).

The grant recipients are required to help researchers determine how alternative fuels perform by provid-

ing data to the National Renewable Energy Laboratory (NREL). The buses will be monitored for vehicle performance, maintenance, mileage, emissions, and reliability.

The grants were issued as part of DOE's heavy-duty alternative fuel demonstration program. School districts in Arizona, West Virginia, Pennsylvania, District of Columbia, Missouri, Utah, Vermont, New York, Kentucky, New Mexico, and Mary-

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DOE Moves Forward (continued from page 5)

land are participating in the demonstration, which will begin this fall. DOE officials said they will solicit ad-

ditional demonstrations for 1993. For more information, contact your state energy office. □

NREL/DOE to Support Data Collection From California School Bus Demo

The National Renewable Energy Laboratory's Alternative Fuels Data Center (AFDC), funded by the U.S. Department of Energy, in the second quarter of 1993 will contain data from alternative-fuel school buses that are part of California's Safe School Bus Clean Fuel Efficiency Demonstration Program.

The California Energy Commission (CEC) recently announced that it has begun Phase Two of the largest alternative-fuel school bus demonstration program in the country.

The first phase of the Safe School Bus Clean Fuel Efficiency Demonstration Program began in early 1991 with the acquisition of 163 clean-fuel school buses purchased by the CEC. Of these buses, 103 have been running on low-sulfur diesel fuel with high-efficiency advanced diesel engines, 50 on M85 (85% methanol-15% unleaded gasoline), and 10 on CNG.

"In order to receive a new clean-fueled bus, each district must trade in

an older, more polluting school bus and agree to collect data for five years," one CEC official said.

Phase Two of this program will begin this fall with the delivery of the first of 400 buses to 47 school districts.

All vehicles in the Phase 2 program will have anti-lock brakes, an extra emergency exit, and the capacity to hold up to 78 passengers. For a breakdown by engine type, see Table 1.

Initially, 10 buses of each fuel type will be distributed. Subsequently, a minimum of 20 buses of each type will be delivered each month, ending in the fall of 1993.

CEC has agreed to provide NREL with vehicle performance, operation, emissions, safety, and maintenance data. To improve accuracy, efficiency, and timeliness, CEC plans to automate the data collection process through the use of 120 data loggers that will measure idle time, acceleration time, and fuel consumption. □

California to Share Expanded Heavy-Truck Data with NREL

California has expanded its heavy-duty alternative-fuel vehicle program to include compressed natural gas (CNG), and will share new data with the National Renewable Energy Laboratory's (NREL's) Alternative Fuels Data Center (AFDC). The U.S. Department of Energy will fund the data collection effort.

Oil overcharge funds have enabled the state of California and the South Coast Air Quality Management District to develop an extensive alternative-fuel demonstration program, particularly for methanol.

The initial demonstration evaluated nine methanol trucks for one year for performance, safety, maintenance, reliability, and cost-effectiveness. Five engine manufacturers—Detroit Diesel Corporation, Caterpillar, Cummins, Ford, and Navistar—were represented. The second phase of this program will choose one or more of the successful engines for a high-mileage demonstration evaluation.

With a growing interest in CNG, the sponsors have expanded the program to evaluate CNG engines. Three engine manufacturers and sites will be chosen. The Vons Company was the first to receive a truck equipped with a Caterpillar 306 CNG engine; other sites and engines have not yet been determined.

The program was also responsible for the installation of four refueling stations.

California-based consultant Acurex, who will perform the data collection on these vehicles, has agreed to share the information with the AFDC. □

*California School Bus Demonstration Vehicles
Phase 2*

TABLE 1

Bus Type (number)	Engine Type	Fuel	Horsepower	Cost/Bus
Carpenter Bus Company (100)	Detroit Diesel Corporation 6V-92TA	M85	253	\$140,193
Blue Bird Bus Company (100)	Tecogen Tecodrive 7000 turbo-charged	CNG	222	\$117,530
Thomas Bus Company (200)	Caterpillar 3116-TA Advanced Diesel	Low-sulfur Diesel	229	\$82,808

DOE Alternative-Fuels Hotline Receives More Than 1,000 Calls

Well over 1,000 callers with questions on a variety of fuels and vehicle technologies have been assisted by the National Alternative Fuels Hotline for Transportation Technologies sponsored by the U.S. Department of Energy (DOE).

Most of the questions involve vehicle conversions, with more than 30% of all callers asking about conversions to CNG, and more than 15% requesting information on LPG conversions. Other callers made inquiries regarding electric vehicle conversions, availability of original equipment manufacturer (OEM)-produced alternative-fuel vehicles, and the availability of fueling stations around the country.

The hotline has also assisted numerous fleet managers and fleet consultants with questions regarding economics of alternative fuels, regulatory guidelines, and other market considerations.

More than 20% of all callers expressed an interest in ethanol, either as a fuel blend or a near- neat alcohol fuel such as E85 or E95 (85% methanol-15% gasoline or 95% ethanol-5% gasoline). A number of callers also were interested in production methods. Similarly, 15% of all callers had questions regarding the use of fuel methanol and methyl tertiary butyl ether.

The hotline also helps the public use the Alternative Fuels Data Center (AFDC), and will retrieve information for callers.

The general public may reach the hotline between 10 a.m. and 6 p.m. Eastern Daylight time, Monday through Friday (except federal holidays) at 1-800-423-1DOE, or by calling 202-554-5047 in the Washington, DC, area. □

National Energy Strategy Passes Congress; Boost Seen for AFVs

A boost was given to alternative transportation fuels under the Comprehensive National Energy Policy Act of 1992, which passed Congress on October 8, 1992.

The new law provides tax deductions for the purchase of "clean fuel vehicle property," defined as the engine, fuel storage and delivery equipment, and exhaust gas handling equipment. After June 30, 1993, deductions are allowed up to \$2,000 for a light-duty vehicle up to 10,000 lbs., up to \$5,000 for a vehicle between 10,000 and 26,000 lbs., and up to \$50,000 for a truck over 26,000 lbs or a bus seating at least 20 people. Dedicated alternative-fuel vehicles (AFVs) qualify for the deduction on a full-cost basis for the qualified property, while dual-fueled vehicles qualify only to the extent of the incremental cost above a vehicle powered by a conventional fuel.

The law also allows a deduction of up to \$100,000 for the cost associated

with equipment for the storage and dispensing of alternative fuels.

The bill also boosts federal and state vehicle purchase requirements. Under the Act, federal purchases of AFVs will be phased in, increasing to 75% of federal fleet acquisitions in 1999 and thereafter. The rule applies to federal fleets of 20 or more that are centrally fueled in metropolitan areas with populations greater than 250,000. A similar rule was adopted for states, but leaves room for states to substitute voluntary conversion programs at their discretion.

Provisions were included for private fleets of 20 or more in large metropolitan areas, but these rules are conditional on findings that the program is necessary and practicable, and that adequate alternative fuels, infrastructure and vehicles are available to support the program. Legislative summaries are available from the National Alternative Fuels Hotline at 800-423-1DOE. □

Valuable Maintenance Data on AFVs Added to AFDC

How much does it cost to repair and maintain alternative-fuel fleet vehicles (AFVs) in the federal fleet? Maintenance data being added to the Alternative Fuels Data Center (AFDC) will provide AFDC users with a glimpse into the repair and maintenance logs of fleet vehicles.

The data include the type of driver complaint registered, the type of repair or maintenance required, and the costs associated with repairs or replacements of parts. Other information includes cost of lubricants, parts, shop supplies, labor, and hazardous waste.

Maintenance information will ultimately be collected and contained in the AFDC from 690 AFVs running on compressed natural gas, M85 (85% methanol-15% unleaded gasoline), and E85 (85% ethanol-15% unleaded gasoline), as well as 16 gasoline control vehicles.

Data on emissions and oil sample analyses will be provided on a percentage of these vehicles.

AFDC users may access this information by clicking on the maintenance icon-shaped like a wrench-in the Windows version of AFDC Term. The information will be updated monthly.

Meetings and Conferences

November 1992

November 10-11

Nebraska Annual Alternative Fuel Conference, Central Community College, Platte Campus, Columbia, NE. For more information contact Kathy Harsh, 800-642-1083 (only in NE), 402-562-1243, or write:
NAFC
attn: Kathy Harsh
Central Community College, Platte Campus
P.O. Box 1027
Columbus, NE 68602-1027

November 8-13

Winter Annual Meeting, American Society of Mechanical Engineers, Anaheim, CA. For more information contact ASME, 212-705-7795, or write:
ASME
attn: June Leach
345 E. 47th Street
New York, NY 10017

November 16-19

Renewable Energy, Food Processing and Eco-tourism for the Pacific Islands, Royal Waikoloan Hotel Resort, Kona, HI. For more information contact U.S. ECRE, 202-408-0665 or write:
U.S. ECRE
attn: Kathy McGee
Suite 805
777 N. Capitol St., N.E.
Washington, DC 20002

December 1991

December 8-10

World Methanol Conference, Hotel Loews Monte-Carlo, Monaco. For more information contact Crocco & Associates, Inc., 713-875-5990, fax 713-875-2059, or write:

Crocco & Associates, Inc.
16800 Greenspoint Park Drive
Suite 145 South
Houston, TX 77060-2307

December 14-15

Liquid Fuels From Renewable Resources, Nashville Convention Center, Nashville, TN. For more information contact John Hiler, 616-429-0300 or write:
American Society of Agricultural Engineers
attn: John Hiler
2950 Niles Road
St. Joseph, MI 49085-9659

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ALTERNATIVE FUELS DATA CENTER
P.O. Box 70879 • Washington, DC 20024