

# Alternative **FUELS**

Vol. 2, Number 4



## **REINVENTING TRANSPORTATION: ALTERNATIVE FUELS, THE FEDERAL FLEET CONVERSION TASK FORCE, AND THE TRUCKING INDUSTRY**

*By Commissioner Garry Mauro, Texas General Land Office*

Projections from the United States Department of Energy indicate that by the year 2000, the United States will likely be importing 55 to 60 percent of the transportation fuel it uses. Domestic oil production is already at its lowest level in over 30 years. According to the American Petroleum Institute, the domestic oil and gas industry has lost over 450,000 jobs since 1981. This has been catastrophic for those Americans directly affected by our shrinking domestic industry, and our national economy as a whole.

For the last two decades, we have been exporting our national wealth for imported oil. Since 1970, the United States has imported some \$1.3 trillion dollars worth of oil. This accounts almost single-handedly for the accumulated foreign trade deficits that have made the United States the largest international debtor nation in the world.

The development of alternative transportation fuel resources is an ideal way to decrease our dependence on imported oil, bolster our recovering economy, and improve the quality of the air we breathe. Alternative fuels, such as natural gas, are a proven, cost-effective

way to reduce harmful vehicle emissions. As an untapped market with practically limitless potential, alternative fuels also represent a tremendous opportunity for American industry.

Recognizing the significant environmental as well as economic and energy security benefits that would result from increased usage of alternatives to gasoline and diesel, the President issued on April 21, 1993, Executive Order 12844 to ensure that the federal government encourage the use of alternative fueled vehicles (AFVs). The Executive Order established a task force, known as the Federal Fleet Conversion Task Force, to develop and recommend a coordinated public/private sector plan for accelerating the commercialization, production, and market acceptance of AFVs nationwide. The plan is designed to use the buying power of the federal government with that of state and local governments and the private sector to rapidly expand the manufacture of AFVs and the development of the refueling and service infrastructure necessary to support their use.

During the last few months, the task force, which I have the privilege to chair, has worked to develop

a plan which we believe will make this goal a reality. While the report focuses on the federal fleet, I believe its implementation will provide the catalyst for developing alternative fuels markets throughout the American transportation sector.

The trucking industry is a key player in the kind of alternative fueled future we envision. Although technical considerations involved with switching heavy-duty trucks to alternative fuels present some significant challenges, the rewards of such efforts are worth it.

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# NEARLY NEAT (100%) ETHANOL IN HENNEPIN COUNTY, MINNESOTA SNOW PLOWS

By Jeff Obst, Hennepin County Energy Conservation Coordinator

In 1983, Hennepin County Commissioners approved a resolution directing "...that ethanol be used as fuel for county motor vehicles and machine equipment whenever practicable..." This resolution was adopted in the context of a large urban county wanting to support farmers caught up in the stark realities of a recession and low farm prices. Since then, Hennepin County has been aggressively promoting the use of ethanol and searching for opportunities to use this alternative fuel in practical settings.

In 1990, staff from Hennepin County contacted the ATA Foundation and learned about the Midwest Ethanol Demonstration Project which was designed to demonstrate and evaluate the use of alternative fuels in heavy-duty vehicles. This project would be conducted under the "umbrella project" for Heavy-Medium-Duty Truck Demonstrations being man-

aged by the Trucking Research Institute (TRI), a subsidiary of the ATA Foundation, under subcontract with the National Renewable Energy Laboratory (NREL). Since that initial contact in 1990, Hennepin County has worked closely with William Peerenboom, Vice President of the ATA Foundation, to coordinate the many preliminary details leading to eventual operation of the trucks on site.

The purpose of this project is to:

- Contribute to the current level of knowledge of ethanol-powered vehicles.
- Conduct a practical demonstration of ethanol-powered vehicles using snowplow/dump trucks in a cold weather environment.
- Gather objective data to ascertain the applicability of ethanol-powered vehicles for NREL's Alternative Fuels Data Center.

What is unique about this three-year research project is the percentage of ethanol in the fuel blend. We are accustomed to hearing about the Clean Air Act Amendments of 1990 which require 39 U.S. metropolitan areas to use a fuel blend in a ratio of 10% ethanol to 90% gasoline. However, this heavy-duty truck project requires that truck engines be retrofitted to operate on a fuel blend of 95% ethanol to 5% denaturant (gasoline or diesel fuel) to determine the viability of this cleaner burning fuel in difficult road work operation. The Trucking Research Institute (TRI) saw Minnesota as an excellent location for testing the 95% ethanol blend because of temperature extremes and engine stress from

heavy equipment operations such as snow-plowing in the winter and asphalt work in the summer.

Though straight diesel fuel has traditionally been favored by heavy-duty truck operators, exhaust emissions from incomplete burning of diesel and gasoline fuels and a national policy striving for energy independence make testing of alternative fuels sound government policy. Note that "100%" ethanol is not available for sale for fear it might be consumed.

Hennepin County will complete testing over a three year period studying the following:

- Engine and vehicle performance;
- Fuel and fuel storage issues;
- Safety concerns; and
- Emission results.

This will be a practical demonstration using snowplows/dump trucks in their regular work assignments. In Hennepin County, the project includes two ethanol-powered trucks and one diesel-powered control vehicle. The tandem snowplow/dump trucks are powered by Detroit Diesel 6V92TA 300 horsepower engines. The chassis are Navistar F5070 International Vehicles. Interstate Detroit Diesel of Minneapolis installed two 6V92TA engines to accommodate the 95% ethanol blended fuel. The primary differences between ethanol and diesel engines are changes in the fuel injectors, fuel pumps, and other fuel system components. In addition, the ethanol engines also have glow plugs and a catalytic converter.

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## Alternative FUELS

IN TRUCKING

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Timothy R. McGrath, Editor

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The aim of **Alternative Fuels in Trucking** is to keep fleet owners and operators, equipment suppliers, government officials, and other interested parties informed of important developments that affect the use of alternative fuels in heavy-duty trucks. Suggestions and comments are welcome. Articles written by guest authors express their own views, and not necessarily the views of ATAF.

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**International Paystar 5000, F-5070**

- GVWR: 56,000; Legal: 49,500
- Wheel base = 188 inches
- Setback front axle
- 15 foot aluminum dump body
- Engine: Detroit Diesel 6V92TA, 300HP, 950 ft/lb torque
- Transmission: Fuller 8ILL, OD, RTX-11708LL, 4.78 axle ratio

TRI will collect data on the operation, safety, maintenance, and repair history of these vehicles. Also, the University of West Virginia will collect periodic emissions data using its portable chassis dynamometer. All data obtained from this demonstration will be provided to the NREL's Alternative Fuels Data Center, and will be made available to the public so that other jurisdictions considering the use of alternative fuels in their heavy-duty trucking operations will have the benefit of the information gathered in this project.

The funding sources for this project are both public and private.

The United States Department of Energy, through its National Renewable Energy Laboratory, and Hennepin County, Minnesota are sources of public funding, while the Minnesota Corn Research and Promotion Council and Archer Daniels Midland Company have privately funded significant amounts of ethanol fuel for this Hennepin County project. All of the sponsors were asked to contribute a nearly equal amount to the project in order to maximize this project's benefits. The project represents an excellent example of government/ industry cooperation wherein the objectives of cleaner

air, energy independence, and basic engine/vehicle research are brought together in a cost-effective manner.

Representatives from the U.S. Department of Energy, Trucking Research Institute, National Renewable Energy Laboratory, and fuel donors Archer Daniels Midland and the Minnesota Corn Research and Promotion Council participated with many other dignitaries in a kickoff for operational use of the vehicles on October 27, 1993 at Nicollet Island in Minneapolis. Hennepin County Commissioners present at this event said that they have aggressively supported the county's involvement in this project since 1990 because of their commitments — to alternative fuels and renewable energy sources; — to the promise of a cleaner, environmentally friendly technology; — and to ethanol as a midwest product in addition to the economic benefits in Minnesota and throughout the region.

*Jeff Obst, Hennepin County's Energy Conservation Coordinator, is also the Senior Environmentalist for Hennepin County's Department of Environmental Management. His work involves various facets of energy conservation including promotion of alternative fuels and alternative transportation, as well as coordination of projects such as retrofitting buildings with state of the art energy conservation equipment.*

## **ALTERNATIVE FUELS POWER TRUCKING INTO THE 21ST CENTURY**

*By Congresswoman Leslie L. Byrne (D-VA)*

When it comes to powering our nation's transportation system, we are in a "Catch-22." As our economy grows, we rely more and more on the transportation industries to ship goods from coast to coast. We use increasingly larger amounts of oil, much of which we import, to fuel the system. But the more we depend on oil, the more our country's long-term economic, political, and environmental interests are threatened.

None of us wants to go to war in the Persian Gulf each time our oil supply is threatened by international aggression and political instability. Nor do we want to leave our children a world in which the air is so thick with smog they cannot go outside. The district I represent in northern Virginia is one of over 20 areas nationwide which do not meet national Clean Air Act standards and must reduce emissions or lose crucial highway funding. At the same time, we must ensure that our transportation industries have adequate resources.

One solution to our quandry has yet to be fully explored. Alternative fuels such as methanol, ethanol, liquid propane gas, bio-diesel, and liquefied and compressed natural gas can reduce our dependence on foreign oil and reduce air pollution. Most alternative fuels are readily available here in the United States. Use of these fuels can power a cleaner-burning engine that runs longer and requires less maintenance. Our nation's transportation system can enter a new era of clean air and home-grown fuel supplies.

As a member of the House Public Works and Transportation Committee, I have struggled with the question of how to lower our dependence on foreign oil and bring alternative fuels into wider use. The Clean Air Act Amendments of 1990 set national air quality standards along with targets for the sale of alternative fueled vehicles (AFVs). Although heavy truck fleets are exempt from the AFV targets, many operate in Clean Air non-attainment areas and are contributing to air pollution problems.

Rather than mandating a course for the industry to follow, Congress enacted incentives to let the industry chart its own course. The 1992 Energy Policy Act created tax incentives for companies that purchase AFVs and build alternative fuel filling stations. It also created a public/private cooperative to increase usage of AFVs through the collection and dissemination of data.

The private sector has made great strides in making alternative fuel engines a reality. Companies such as Mack, Cummins, Caterpillar, General Motors, and Detroit Diesel have built engines that use various forms of alternative fuels. Washington Gas is in the process of setting up accessible refueling stations around the nation's capital to serve the growing population of natural gas fueled vehicles (NGVs).

Industry organizations like the ATA Foundation's Trucking Research Institute (TRI) have helped to build bridges between the private and public sectors to put this technology into practice. Through programs such as the adaptation of snow plow maintenance vehicles in Nebraska and in

Hennepin County, Minnesota, TRI is helping local governments apply alternative fuel technologies to the needs of their communities, and assisting companies that rely on trucks operating at weights over 8,500 pounds to take part in AFV programs. TRI is also spearheading a joint venture with Washington Gas, United Parcel Service, and the U.S. Department of Energy's National Renewable Energy Laboratory (NREL) to power a fleet of 20 UPS package cars with compressed natural gas. This program will test the ability of medium-duty delivery vehicle fleets to operate in a metropolitan setting using natural gas.

These demonstration projects will provide data on alternative fuel trucking operations and yield answers to critical questions, such as how much power engines can generate on alternative fuels and how far alternative fueled trucks can travel between refueling. This information is crucial if we want to make low emission transportation a reality.

TRI has created a nurturing environment for manufacturers to test their products and study the effectiveness of new technologies on a day-to-day basis. The data collected from these projects will be widely disseminated through the NREL Alternative Fuels Data Center national data base.

In an age of new relationships between government and business, the Trucking Research Institute is a model public-private effort to improve our nation's infrastructure and provide for a cleaner and healthier future for our economy and for our children.

*Congresswoman Leslie L. Byrne, a freshman Democrat from northern Virginia's new 11th Congressional District, is a member of the Public Works and Transportation Committee and serves on the Surface Transportation Subcommittee.*

# FEDERAL FLEET

*Continued from page 1*

Logging more than 283 billion miles annually (13 percent of total vehicle miles), commercial heavy-duty vehicles account for 1.9 percent of all U.S. hydrocarbon emissions, the most important components of air pollution. The trucking industry has a unique opportunity to make a major contribution to air quality improvement. Just as important, the industry will find itself able to reduce its dependence on diesel — much of which is produced from imported oil — which has monopolized commercial transportation for most of its history. Trucking firms will be able to choose among a variety of alternatives, including ethanol, methanol, and natural gas, depending on what makes the most sense for them and the environment.

The First Interim Report of the Federal Fleet Conversion Task Force describes a number of major obstacles impeding the expansion of the alternative fuels market. These include: coordination and clarification of currently disparate federal, state, and local regulations; consolidation of incentive programs; and the growth of a flexible and reliable refueling infrastructure, without which most commercial vehicle transportation is unthinkable.

The backbone of our program is the recently announced Presidential Clean Cities Initiative. The Initiative would have two components. The first is a locally-directed program to accelerate alternative fuels use. This would involve a coordinated public/private effort to establish the refueling infrastructure to support their use. The second element of the Initiative would be support at the national level to coor-

dinate AFV efforts to aggregate purchases, ease or remove regulatory impediments, provide incentives for alternative fuels use, and optimize the use of available federal funds.

To support this Initiative, the Federal Fleet Conversion Task Force identified 38 cities and regions, prioritized into three tiers, in which to concentrate the Initiative's efforts in fiscal years 1994 through 1996. This concentration of effort is key to the effectiveness of the Initiative. The 38 cities and regions would receive priority funding for federal vehicles purchased and for infrastructure development.

By targeting federal funding earmarked for AFV purchases, we are working with state and local governments in these regions to foster demand for alternative fuels using the federal fleet as an impetus. But just as important to the success of alternative fuels in this country is the coordination of public efforts, such as the task force, with private sector initiatives. It is only through the cooperation of private industry that alternative fuels can become a truly practical option in large-scale transportation.

A proposed Northeast refueling corridor, for instance, will require substantial initiative from everyone concerned: truckers, commuters, and planners will need to work in concert to identify routes; utilities will need to work with conventional fuel suppliers; Departments of Commerce and other officials will have to work together to locate refueling sites along the routes; and trucking firms and regional conversion centers will need to provide servicing technology and personnel. A coordinated, cooperative, public/private sector effort is crucial to the ultimate success or failure of the alternative fuels revolution.

In the previous issue of this newsletter, Timothy R. McGrath, Editor of Alternative Fuels in Trucking, introduced the ATA Foundation's Alternative Fuels Task Force, which through its coalition of public sector and industry experts explores how best to utilize alternative fuels in the trucking industry. I encourage every reader of this newsletter to join the ATA Foundation's Alternative Fuels Task Force. Tom Hardeman, Vice President of Public Affairs at United Parcel Service, and David Merrion, Senior Vice President for Engineering at Detroit Diesel, both members of the Federal Fleet Conversion Task Force, also serve on the ATA Foundation's Alternative Fuels Task Force. Also among your members are many of the organizations that sent advisors to our task force meetings this summer. It is precisely this kind of cooperative effort that will make alternative fuels use in trucking a reality. I commend your efforts and look forward to working closely with ATA Foundation members in this important and challenging endeavor which can drastically change both our economic and environmental future.

*On April 21, 1993 President Clinton appointed Commissioner Mauro to head a national task force on converting the federal vehicle fleet to natural gas and other clean alternative fuels. The objective of the Federal Fleet Conversion Task Force is to demonstrate that using alternative fuels will save money, reduce air pollution and dependence on foreign oil, and help create an infrastructure that will pave the way for converting thousands of public and private fleets across the nation to alternative fuels.*

## ENGINE PROFILE

# DETROIT DIESEL SERIES 50G "THE NEXT GENERATION" NATURAL GAS ENGINE

**D**etroit Diesel Corporation, headquartered in Detroit, Michigan, introduced the new Series 50 engine in March, 1993 and a natural gas version was announced in September, 1993. The Series 50 engine is a four-cylinder, 8.5 liter version of the very popular six-cylinder Series 60 engine. Both the diesel and natural gas version of the Series 50 engine have been designed for on-highway heavy-duty truck operations.

David Merrion, Senior Vice President of Engineering at Detroit Diesel Corporation, said "I'm oversimplifying, but we basically cut the two middle cylinders out of a Series 60 engine and came up with the 8.5 liter overhead cam, four-cycle, four-cylinder engine."

### Engine Configuration

The Detroit Diesel Series 50G Natural Gas Engine is an 8.5L four-stroke cycle overhead cam utilizing a lean burn combustion process. The engine is derived from the Series 50 diesel.

Important design features of the Series 50G include:

- Spark-ignited, lean burn natural gas combustion process;

- Distributorless, high energy ignition system;
- Turbocharger with wastegate;
- Low pressure natural gas fuel supply regulator;
- Air-to-air charge cooling;
- Natural gas fuel injection, downstream of the air-to-air charge cooler; and
- Compression ratio of 10:1.

The Series 50G engine will meet CARB emissions standards and certification will occur in the early Spring of 1994. The Series 50G engine has leanburn combustion, turbocharging with air-to-air charge cooling, and electronic engine controls which provide superior fuel economy and knock-free engine operation.

### Engine Fuel System

The natural gas metering valve is solenoid actuated and DDEC controlled. The valve meters and controls the admission of low pressure gas to the intake air system, after the air-to-air charge cooler and ahead of the throttle body.

### Emissions

The Series 50G engine meets all Federal EPA emissions require-

ments. The technology utilized in the Series 50G will enable the engine to surpass the emissions characteristics of other currently available lean burn natural gas engines.

### Catalytic Converter

A catalytic converter is required to meet the emissions standards. The converter will be similar to that used on the DDC alcohol-fueled engine.

### Warranty

Two year/unlimited miles; same as Series 50 diesel.

### Schedule

Production was initiated this past September with volume capability expected in the spring of 1994.

### Ratings

The engine will be offered in two ratings:

- 275 bhp @ 2100 rpm and peak torque of 890 lb/ft @ 1200 rpm; and
- 250 bhp @ 2100 rpm and peak torque of 780 lb/ft @ 1200 rpm.

The technology being applied to the Detroit Diesel Series 50G can also be applied to the Series 60 engine to help achieve low emissions.

**Alternative FUELS**  
I N T R U C K I N G

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