CASE STUDY

Alternative-Fuel Vehicles Contribute to a Bright Future

Demonstration Project Proves Value of Gasoline Substitutes

The Alternative Motor Fuel Act (AMFA) of 1988 directs the U.S. Department of Energy (DOE) to purchase original equipment manufacturer (OEM) alternative-fuel vehicles (AFVs); use them in the federal fleet; and collect data on their performance, fuel economy, and durability. Managed by the National Renewable Energy Laboratory (NREL), this demonstration project analyzes fuel economy, performance, safety, maintenance, emissions, and costs of AFVs. The information gathered is made available to the public as well as researchers through an NREL database.

Argonne National Laboratory is the largest demonstration center in DOE's program. The Laboratory's involvement began in 1992 when it leased five compressed natural gas (CNG) vans and three ethanol sedans. Today, its 300-vehicle fleet includes 62 alternative-fuel sedans, vans, minivans, and pickup trucks. In addition, seven gasoline-fueled vehicles also participate in the AMFA Program for comparison.

The AFVs are an integral part of Argonne's fleet. Employees use them in their daily work, including material pickup and delivery, maintenance activities, field supervision, equipment installation, mail delivery, security, ambulance/rescue/fire, off-road/road repair, chauffeuring laboratory visitors,

continued

and driving to meetings. They can be used only for official business, but they may be taken overnight for business trips. The data and experience gained from Argonne's fleet are documented in the AMFA Program.

What Are Alternative Fuels?

To reduce the air pollution caused by motor vehicles, changes in fuels and automotive technology are needed. Exhaust pollutants, such as carbon monoxide, carbon dioxide, nitrogen oxides, and hydrocarbons, increase air pollution, the buildup of greenhouse gases, and global warming. Replacing gasoline with alternative fuels will lessen U.S. dependence on foreign oil, reduce exhaust emissions, and prevent air pollution.

Methanol	
Composition:	Alcohol produced from natural gas, biomass, or coal
Advantages:	• Renewable fuel • Burns cleaner than gasoline • Produces cleaner emissions
Ethanol	
Composition:	Alcohol produced from biomass, such as corn or agricultural waste
Advantages:	• Renewable fuel • Burns cleaner than gasoline • Produces cleaner emissions
CNG	
Composition:	Mixture of methane (93%) and other hydrocarbons derived from gas wells or as a by-product of crude oil production
Advantages:	• Burns more completely than gasoline, so it emits less carbon monoxide • Readily available • Less expensive than gasoline
Propane	
Composition:	By-product of petroleum refining and natural gas production; also known as liquefied petroleum gas
Advantages:	• Burns cleaner, cooler, slower, and more uniformly than gasoline • Less engine stress and cleaner emissions • Less expensive than gasoline

The most commonly available alternative fuels are ethanol, methanol, CNG, and propane (also called liquefied petroleum gas [LPG]).

Leasing AFVs

Argonne leases its AFVs through the General Services Administration (GSA), which purchases all the AFVs in the federal fleet. New vehicles are phased into the Argonne fleet as soon as they become available.

Although AFVs cost more than gasoline-powered vehicles (CNG vehicles may be as much as 25% higher), the GSA reduces the monthly leasing cost for AFVs by 10% when operators primarily use alternative fuel. The GSA usually retires sedans after three years of service and vans or trucks after seven years. As many replacement AFVs are purchased each year as budget and availability allow.

Maintaining AFVs

The GSA provides a monthly listing of AFVs that need preventive maintenance and instructions for each vehicle. By performing

AFVs Available from the General Services Administration

M85 – Compact and midsize sedans, 8-passenger vans
E85 – Midsize sedans
CNG – 8-passenger vans, 1/2- and 3/4-ton pickup trucks
Propane – Pickup trucks

preventive maintenance on site, Argonne provides professional development opportunities for its mechanics. Although not required by the Laboratory, most Argonne mechanics are trained and certified to work on CNG vehicles through the National Institute for Automotive Service Excellence.

Relatively minor design changes turn a gasoline-fueled car into an AFV fueled by E85 or M85; a CNG-fueled car needs more extensive modifications because of its gaseous fuel. Argonne mechanics have experienced few differences in servicing gasoline vehicles and AFVs. However, they do follow more stringent safety procedures because M85 and E85 are more corrosive than gasoline, and the vehicles require special motor oil.

Information on maintaining and repairing AFVs is collected as part of the AMFA Program. Most of the service requests reported relate to the fuel system, such as leaks and inaccurate fuel gauges. The vehicles are returned to local car dealers for repairs that are covered under warranty. Only two AFVs were returned to GSA after repeated unsuccessful attempts to correct problems.

Refueling AFVs

Because few commercial alternative-fuel stations exist, Argonne maintains its own refueling stations:

- The M85 fueling station operates under the Federal Methanol Fleet Demonstration Program. Because methanol is a liquid, it is dispensed similarly to gasoline.
- The E85 fueling station required equipment modifications to receive an air quality permit from the Illinois Environmental Protection Agency. The station became operational in March 1993 and was upgraded to meet stricter vapor emission requirements in October 1994. The liquid ethanol is dispensed in the same way as gasoline.
- For the CNG vehicles, a portable gas-powered unit compresses natural gas and dispenses it into the fuel tanks. Because it takes about four hours to compress enough natural gas to fill one vehicle, vehicles are scheduled for only one refueling per week. A special procedure is used for CNG refueling because of the unique properties of the fuel and the need for special safety precautions.
- The propane-fueled pickup truck is refueled from a propane tank kept on site.