Executive Summary

Abstract

This annual report to Congress presents the current status of the U.S. Department of Energy's alternative fuel vehicle demonstration and performance tracking programs being conducted across the country in accordance with the Energy Policy and Conservation Act (42 U.S.C. 6374, et seq.). These programs, which comprise the most comprehensive data collection effort ever undertaken on alternative transportation fuels and alternative fuel vehicles, are beginning their sixth year. This report summarizes tests and results from the fifth year. Even though present interest in electric vehicles is quite high, they are not currently included in these vehicle demonstration and performance tracking programs, and the annual report does not include information on them.

Since the inception of the programs, great strides have been made in developing commercially viable alternative fuel vehicle technologies, these achievements having been accomplished in large part as a result of the Department of Energy's direct encouragement and support. However as is the case in the commercialization of all new technologies, some performance problems have been experienced on vehicles involved in early demonstration efforts.

Substantial improvements have been recorded in vehicle practicality, safety, and performance in real-world demonstrations, especially during the past year. An aspect of particular interest is emissions output. To date, results from light-duty alternative fuel vehicles procured from original equipment manufacturers and operating in the Federal fleet have demonstrated superior in-service emissions performance. In addition, heavy-duty alternative fuel vehicles have demonstrated dramatic reductions in particulate emissions. On the other hand, emissions results from vehicles converted to run on alternative fuel have not been as promising. These and other findings are available through the Department of Energy's Alternative Fuel Data Center World Wide Web site (http://www.afdc.doe.gov).

Although the technologies available today are already commercially viable in some markets, further improvements in infrastructure and economics will result in greater market expansion and an attendant increase in the number of vehicles deployed. To this end, the Department of Energy plans to continue its efforts to foster additional growth toward technically and economically viable alternatives to petroleum-based transportation fuels.

Through these and other alternative fuels programs, and with the assistance of its staff and technology

The Fuels Being Tested

In all, the three programs being managed by the U.S. Department of Energy are testing five kinds of alternative fuels—methanol, ethanol, compressed natural gas, liquefied natural gas, and propane—plus biodiesel. What are these fuels and why are we testing them?

Methanol. Methanol is an alcohol derived primarily from natural gas, but it can also be derived from biomass or coal. Thus the potential domestic resource base for methanol is vast. Methanol's combustion holds the promise of producing less carbon monoxide and non-methane hydrocarbons than gasoline and less particulate matter than diesel. It may also be converted into methyl tertiary butyl ether for a high-octane, oxygenated additive with gasoline.

Ethanol. Ethanol is an alcohol derived from biomass (corn, sugar cane, grasses, trees, and agricultural waste). The potential domestic resource base for ethanol is also vast. Ethanol's combustion promises emissions similar to those from methanol. And, like methanol, it also can be used to make a high-octane, oxygenated ether.

Compressed Natural Gas and Liquefied Natural Gas. Natural gas is primarily methane (approximately 93 percent) with a mixture of other gaseous hydrocarbons. It is derived from gas wells or in conjunction with crude oil production. The United States has proven natural gas reserves of approximately 170 trillion cubic feet; current natural gas consumption is primarily (89 percent) derived from domestic sources, with the remainder coming mainly from Canada. Relative to gasoline, the combustion of natural gas promises to cut emissions of carbon monoxide and non-methane hydrocarbons. The difference between the compressed and liquefied versions of natural gas lies in the phase in which they are stored. To obtain the liquefied version, the gas must be cooled considerably and stored in insulated tanks.

Propane. This is a gas composed primarily of the three-carbon molecule propane and other gaseous hydrocarbons. It is extracted from natural gas or refinery gas streams. Its emissions are expected to be similar to those of natural gas.

Biodiesel. As tested in this program, biodiesel (B20) is actually a low-level blend of 20 percent diesel derived from biomass, microalgae, or agricultural waste and 80 percent conventional diesel. Although it has properties similar to conventional diesel fuels, its potential value derives from the fact that its production can be based on a domestic and renewable resource. However, only B100 (neat biodeisel) is currently considered by the U.S. Department of Energy to be an alternative fuel under the definition contained in the Act.

partners around the country, the U.S. Department of Energy continues to make significant contributions toward achieving the national goals of increasing energy security, reducing trade deficits, creating more domestic jobs and industries, and promoting cleaner air.

Summary of Results

Light-Duty Vehicles

The Federal light-duty vehicle demonstration program studies emissions, vehicle performance, and fuel economy on passenger cars, minivans, and light vans and trucks that operate on alternative fuels. This effort is focused on meeting the requirements of section 400 AA of the Energy Policy and Conservation Act (The Act). At the Federal level, alternative fuel vehicles are required to be purchased from the original equipment manufacturers and placed in service throughout the Federal fleet.

The number of alternative fuel vehicles in the Federal fleet has grown to nearly 20,000. For cost effectiveness, and to minimize the impact on day-to-day government operations, data are collected only on a sample of this number. The light-duty vehicle test program is currently collecting data from 337 vehicles that operate on one of the alternative fuels, plus 146 vehicles that operate only on reformulated gasoline (the control group).

New models added in program year 1995 include the 1995 Dodge Caravan, a dedicated compressed natural gas vehicle, and the 1995

Dodge Intrepid, a flexible-fuel vehicle operating on 85 percent methanol. Information obtained from the analysis of light-duty vehicle data through August 1995 includes emissions, performance and reliability, fuel economy, and cost.

Emissions

Emissions measurement is the single most comprehensive part of the test program for light-duty vehicles. The effort being undertaken is also the most extensive and carefully controlled study of emissions of alternative fuel vehicles in the world. Phase I testing began in 1991 and lasted through 1994. To obtain results from a wider range of alternative fuel vehicles at a higher level of statistical reliability, the number and types of vehicles tested were greatly increased under Phase II of the program.

Average emissions from the four-cylinder methanol Dodge Spirits are well below the Federal emissions standards for non-methane hydrocarbons, carbon monoxide, and oxides of nitrogen. The regulated exhaust emissions from the ethanol tests on the variable fuel vehicles were 15 percent to 20 percent lower than those from the reformulated gasoline tests on the same vehicles. Analysis from the first round of testing of the Dodge B250 vans indicates notably lower emissions of regulated exhaust pollutants from the compressed natural gas vehicles in contrast to those produced by the standard gasoline vehicles. The exhaust emissions from the flexible-fuel Ford Econoline vans tested on methanol were lower than, or similar to, the exhaust emissions of those same vehicles when tested on reformulated gasoline.

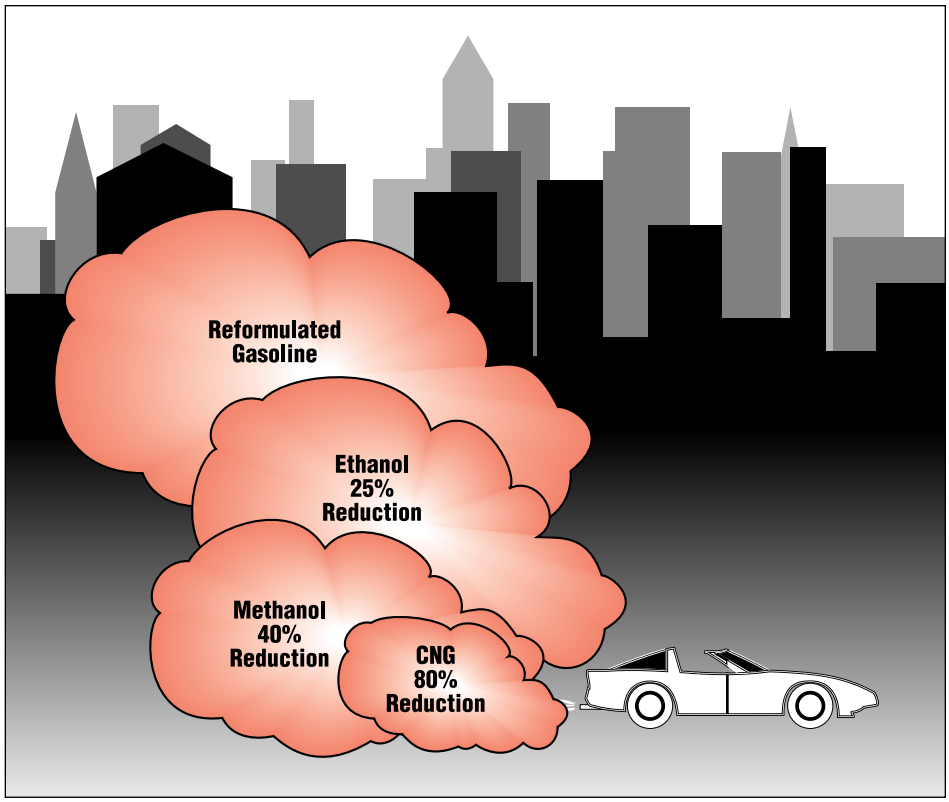

Figure 1. Reduction in light-duty vehicle urban ozone-forming potential attributable to alternative fuels

The urban ozone-forming potential calculated from the alternative fuel vehicle emissions was substantially less than their reformulated gasoline counterparts. Urban ozone-forming potential was reduced 25 percent, 40 percent, 50 percent, and 80 percent for the ethanol Chevrolet Luminas, the methanol Dodge Spirits, the methanol Ford Econoline vans, and the compressed natural gas Dodge B250 vans, respectively. These results are illustrated in Figure 1.

Performance and Reliability

Information has been collected regarding the performance and reliability of alternative fuel vehicles, and their standard gasoline counterparts, for nearly four years. As expected, drivers reported more performance

problems, on average, for the early-model alternative fuel vehicles than for the later-model vehicles. From the drivers' perspective, the performance of alternative fuel vehicles in general has improved with time, and is now nearly equal to the accepted performance level of gasoline vehicles.

Fuel Economy

Testing of vehicles on a chassis dynamometer, and analysis of refueling records from actual daily use, have resulted in two sources of fuel economy information. In the first case, information is obtained on each vehicle at the time of emissions testing on a chassis dynamometer. In the second case, actual in-use fuel economy is calculated using refueling records maintained in the Department of Energy's Alternative Fuels Data Center at the National Renewable Energy Laboratory. During actual use, vehicle fuel economy varies considerably because of individuals' driving styles and a number of other factors, such as the type of driving (stop-and-go city driving, highway driving, deliveries, or a combination of all three), climate, and altitude. On an equivalent energy basis, vehicles operating on alternative fuels tend to achieve levels of fuel economy that are similar to those achieved by standard vehicles operating on gasoline.

Cost

Total vehicle cost includes initial acquisition, insurance, maintenance, fuel, and oil.

The information available to date on alternative fuel vehicles in the Federal light-duty vehicle demonstration program indicates the cost of acquiring those vehicles ranges up to 25 percent higher than the cost of comparable gasoline vehicles. For flexible-fuel vehicles in particular, the price increases range between $0 to $800, depending on the manufacturer. For compressed natural gas vehicles, the price increase can be as much as $5,000 per vehicle.

In September 1995, retail pump fuel prices across the country ranged from approximately $1.60 to $1.87 per gallon of 85 percent ethanol, $2.00 to $2.88 per gallon of 85 percent methanol, $0.60 to $1.14 per gallon of compressed natural gas, and $1.10 to $1.18 per gallon of regular unleaded gasoline. These price ranges account for differences in fuel energy content and reflect the alternative fuel cost on a per-gallon-of-gasoline equivalent basis.

Most maintenance on General Services Administration vehicles is done under warranty at no cost to the fleet operator (except for lost time in service). Therefore, data on the actual cost of maintenance, and a summary of average maintenance costs per mile, are not yet available. Analysis of information available to date indicates that the number of unscheduled repairs on alternative fuel vehicles decreases with each new model year. This evidence, along with growing experience, increases the confidence that in the long-term, average maintenance costs for alternative fuel vehicles will approach those of standard gasoline vehicles.

Transit Buses

The Federal transit bus demonstration program (section 400 CC of the Act) is designed to provide a comprehensive study of the alternative fuels currently used by the transit bus industry. The following eight metropolitan areas were selected for program participation: Houston, Texas; Miami, Florida; Minneapolis, Minnesota; New York, New York; Peoria, Illinois; St. Louis, Missouri; Tacoma, Washington; and Portland, Oregon. Buses used by the transit agencies of these municipalities are being operated on, and are undergoing a number of tests on, four different alternative fuels—compressed natural gas, liquefied natural gas, methanol, ethanol—plus B20 (a low-level blend of 20 percent biodiesel and 80 percent conventional diesel fuel). Only B100 (neat biodiesel) is considered an alternative fuel under the Act.

The alternative fuel engines included in the transit bus demonstration program are: Detroit Diesel 6V92TA methanol engine; Detroit Diesel 6V92TA ethanol engine; Detroit Diesel 6V92TA pilot ignition natural gas engine; Cummins L10G natural gas engine. All transit buses are 35-foot or 40-foot models manufactured by Mercedes, Flxible, Gillig, TMC, and BIA.

Emissions

With funding from the U.S. Department of Energy, West Virginia University's Department of Mechanical and Aerospace Engineering designed and constructed a transportable chassis dynamometer to test emissions levels from heavy-duty vehicles. The transportability of this chassis dynamometer allows a large number of emissions tests on transit buses and heavy-duty vehicles to be conducted around the country on site.

During 1995, West Virginia University personnel traveled to transit agency facilities in New York City, Miami, Peoria, St. Louis, Minneapolis, Tacoma, and Portland, Oregon, to test transit buses included in the Federal demonstration program.

These tests conducted by West Virginia University show that emissions of particulate matter are reduced to nearly zero in engines fueled with compressed natural gas. This is an important and attractive feature of this fuel that reduces the amount of black smoke emanating from city buses. Transit buses fueled by ethanol and methanol also emit lower particulate matter levels than otherwise identical diesel buses (see Figure 2).

The tests conducted to date show that emissions of hydrocarbons, carbon monoxide, and oxides of nitrogen from alternative fuel transit buses vary more than expected. In some cases, emissions were lowered, but high-emitting alternative fuel vehicles were also found. To identify the sources of the problems, teams of experts were brought together to diagnose and repair high emitters. These teams were comprised of representatives from the National Renewable Energy Laboratory, West Virginia University, the engine manufacturers, and their affected transit agencies. This work helped explain

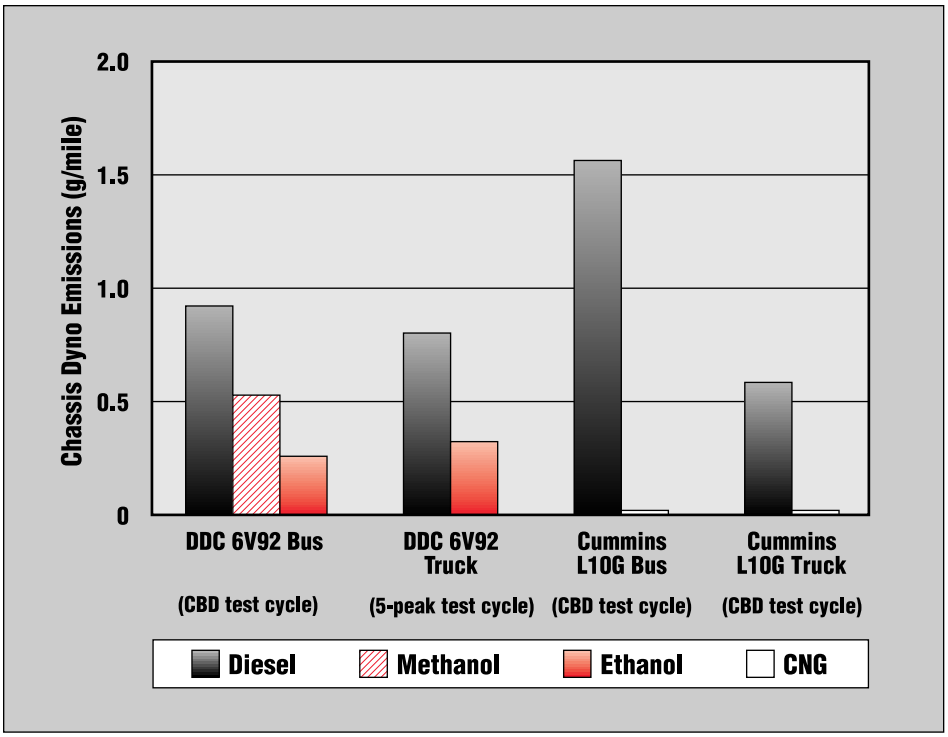

Figure 2. Summary of heavy-duty vehicle particulate emissions results

the causes for high emissions and resulted in dramatic reductions at two transit sites.

West Virginia University's emissions testing activities have helped to underscore two very important points. First, by participating in demonstration programs, transit agencies can play an important role in developing technologies that will help to improve air quality. Second, the diagnosis and repair of high emitters have shown that, even though the use of alternative fuels may reduce emissions, engine technology and proper vehicle maintenance are also crucial factors.

Performance and Reliability

A common measure of transit bus reliability is the number of road calls that are required for every 1,000 miles each vehicle travels. Information on the road calls per 1,000 miles of operation for vehicles in the Federal transit bus demonstration program show the alternative fuels to be quite similar to their diesel counterparts in most locations.

Fuel Economy

Fuel economy and fuel costs are very important to transit agencies because these elements represent a significant portion of the total expense of operating a transit bus. Approximately half the total cost (excluding driver costs) of operating a diesel transit bus is directly attributable to fuel economy and fuel cost.

The average fuel economy for liquefied natural gas/diesel dual-fuel transit buses was approximately 16 percent less than the average fuel economy for their diesel counterparts. Most of this reduction in fuel economy is likely attributable to problems with the engine.

The average fuel economy of the compressed natural gas transit buses from dynamometer and on-road tests is about 10 percent to 20 percent lower than the corresponding average fuel economy for their diesel counterparts. This reduction is within the expected range, as the compressed natural gas engines use a spark-ignited design as opposed to the more efficient compression-ignition design of the diesel engines.

With regard to the fuel economy of alcohol transit buses, the results to date indicate that the vehicles at all the sites are performing very well, delivering fuel economy comparable to that of their diesel counterparts on an energy equivalent basis.

Cost

There are incremental costs associated with operating alternative fuel transit buses. These costs can be aggregated into increased capital outlays and increased operating expenses. Increased capital outlays are attributable to the additional costs (if any) of acquiring alternative fuel transit buses and modifying facilities.

Increased operating expenses are due to a larger number of factors. A breakdown of the estimated total operating costs for a typical large transit agency such as the ones participating in the Federal transit bus demonstration program includes driver labor, vehicle maintenance, administration, and fuel expense. Driver labor costs represent more than half the total.

One common measure, fuel cost per mile, is calculated using average in-use fuel economy and the actual fuel cost paid by the transit agencies. For transit buses operating on compressed natural gas, the fuel and maintenance costs per mile are about the same as those for transit buses operating on diesel. However, for transit buses operating on an alcohol fuel or B20 (a low-level biodiesel blend not considered by the U.S. Department of Energy to be an alternative fuel under the Act), the same costs are up to twice as high as those for transit buses operating on diesel. The fuel and maintenance costs for transit buses operating on dual-fuel liquefied natural gas/diesel are about 25 percent higher than for their diesel counterparts.

Heavy-Duty Vehicles

The Federal heavy-duty demonstration program (section 400 BB of the Act) includes two types of vehicles: medium-sized commercial delivery vans and large trucks (such as line-haul tractor trailers and garbage packers). In total, some 170 delivery vans and large trucks are included in the program. With regard to the medium-sized delivery vans, vehicles in two commercial delivery fleets are included: Federal Express and United Parcel Service. The Federal Express vehicles are evaluated in the CleanFleet project, which is coordinated by Battelle Memorial Institute. The U.S. Department of Energy also manages a grant program that supports states in their purchases of heavy-duty alternative fuel vehicles. The vehicles in the grant program are located all across the country, representing vehicle vocations that range from street sweepers to school buses.

Emissions

During 1995, West Virginia University used its transportable chassis dynamometer to measure emissions from the New York City Department of Sanitation's compressed natural gas garbage packers, Archer Daniels Midland's ethanol line-haul trucks in Illinois, Hennepin County's ethanol snowplows in Minnesota, and AG Processing Corporation's line haul trucks operating on B20, the biodiesel blend, and diesel. A number of diesel control vehicles with the same engine configurations were also tested at each of the sites. Particulate emissions results from this test program on heavy-duty trucks are summarized in Figure 2.

The use of alternative fuels in heavy-duty trucks can substantially reduce particulate matter emissions. The average of particulate matter from the ethanol trucks in the Federal heavy-duty demonstration program is less than 50 percent of the corresponding value for their diesel counterparts. On the other hand, the average particulate matter emissions from the compressed natural gas vehicles is very low. In six of eleven tests performed to date, particulate matter levels are essentially zero (i.e., too low to measure), and the diesel vehicles average approximately 0.7 grams per mile.

Emissions information has also been obtained from the Federal Express CleanFleet project. In this project, 36 delivery vans (actually medium-duty vehicles) were emissions tested at each of three different mileage levels.

The CleanFleet compressed natural gas vehicles emitted an average of 65 percent to 80 percent less carbon monoxide than otherwise identical vehicles running on gasoline. These vehicles also had 70 percent to 95 percent lower non-methane hydrocarbon emissions. Emissions of oxides of nitrogen were mixed.

The difference in emissions from delivery vans operating on propane and those from their counterparts operating on gasoline became more pronounced with increasing mileage. Generally, the average emissions levels from the propane vans remained relatively constant, but the gasoline control vans exhibited increasing values with increasing mileage.

The overall results from the Ford vans running on 85 percent methanol were highly variable; but, in general, these vehicles tend to exhibit lower average carbon monoxide emissions than their gasoline counterparts.

Performance and Reliability

Vehicle performance for heavy-duty trucks and commercial delivery vans encompasses such factors as acceleration, hill climbing, driveability, and driver acceptance. To directly assess the performance of heavy-duty trucks operating on alternative fuels, acceleration and hill climbing capability of a compressed natural gas line-haul truck operated by Vons Grocery Company, and a diesel counterpart, were measured. Acceleration for the two trucks was nearly identical.

Fuel Economy

All fuel economy data for the CleanFleet delivery vans have been collected and analyzed. The Chevrolet propane and compressed natural gas vans and Dodge compressed natural gas vans achieved 10 percent to 15 percent lower in-use fuel economy than their gasoline counterparts on an energy equivalent basis. The fuel economy achieved by all the Ford vehicles (compressed natural gas, propane, and 85 percent methanol) was within a few percentage points of the fuel economy achieved by their gasoline counterparts on an energy equivalent basis. So far, most of the alternative fuel large trucks have exhibited both in-use and dynamometer fuel economy comparable to their diesel counterparts.

Cost

As expected, equipping a prototype or early-production heavy-duty truck to use alternative fuels is more expensive than equipping a similar truck to operate on diesel. As the heavy-duty alternative fuel market develops, such costs are expected to decrease.

In principle, no alternative fuel engine should be inherently more expensive to manufacture than a diesel engine. In contrast, the fuel tanks for compressed natural gas will probably continue to be more expensive. However, this is a relatively small part of the total cost of the vehicle.

A small incremental cost for the fuel system could easily be recovered in lower fuel costs. Fuel cost is generally a large part of the total operating cost of a trucking company—second only to personnel costs. As noted previously, the cost of alternative fuels varies from one fuel to another, both regionally and over time. Federal and state taxes also figure heavily into fuel cost.

Virtually all the heavy-duty, alternative fuel vehicles in the Federal demonstration program cost more to maintain than their diesel counterparts. Most of the vehicles in the program represent prototype, field-test technology, and part of the reason for deploying and tracking them is to work out the bugs in the technology so they can be moved closer to commercialization. Higher maintenance costs are to be expected for such vehicles. As alternative fuel engine manufacturers accumulate experience through such programs, the reliability of the engines will increase and maintenance costs should approach those of their diesel counterparts.

Aftermarket Vehicle Conversions

The Energy Policy Act of 1992 (42 U.S.C. 13212 (a) and (b)), which amends the Act, specifies minimum purchase requirements for alternative fuel vehicles in the Federal fleet. Although alternative fuel vehicles have been under development for more than ten years, their availability from the automotive manufacturers was not sufficient in calendar year 1992 to allow the various Federal agencies to meet the requirements of the Act. “Aftermarket conversions” were chosen to fill the gap until a sufficient number of original equipment models could be made available at a reasonable cost.

The conversion effort has succeeded in helping the Federal government meet the requirements of the Act during a period of otherwise uncertain supply. Original equipment availability has since improved, however.

At this time, light-duty vehicles may be converted to operate on one of two alternative fuels—natural gas or liquefied petroleum gas (propane). Each aftermarket vehicle conversion is protected by a warranty that covers all installed conversion system parts and associated labor for three years or 36,000 miles, whichever comes first. As required by the provisions of the Act, subcontractors signed individual warranty agreements with Chrysler, Ford, and General Motors.

The first light-duty vehicle conversions were completed during the summer of 1994. Conversion activities are continuing through the date of this writing.

Most light-duty vehicle conversions (more than 92 percent) are bi-fuel conversions, which means that the vehicle may operate on either gasoline or the designated alternative fuel. The average total cost for each compressed natural gas conversion in the program is about $4,500. The average total cost for each liquefied petroleum gas conversion, on the other hand, is about $2,700.

Emission Results

Aftermarket conversions can play an important role in the transition to more widespread use of alternative fuel vehicles. However, the emissions performance to date of these relatively advanced conversion systems raises questions about their overall emissions contribution to the environment. There are plans for further testing in 1996 to help answer these questions.

Infrastructure Support

To meet the demands that the increasing numbers of alternative fuel vehicles are placing on the U.S. marketplace, an associated infrastructure has developed. This infrastructure, consisting of refueling sites and maintenance and storage facilities, is the fabric that holds the components of the alternative fuel industry together. Growth of this infrastructure has been stimulated by various legislative incentives, such as the Alternative Motor Fuels Act of 1988, the Clean Air Act Amendments of 1990, the Energy Policy Act of 1992, and Executive Order 12844. Also, the Department of Energy has promoted infrastructure development within the context of its Clean Cities program.

Expanded development of refueling sites faces a number of hurdles, depending on the alternative fuel of interest. For methanol and ethanol refueling stations, it is relatively easy to install a new in-ground or above-ground fuel storage tank. Special attention must be given to the choice of materials used.

For compressed natural gas, all such options are more expensive than those for alcohol fuels. A slow-fill system uses a small compressor and has the lowest cost. A fast-fill system, on the other hand, requires a large and expensive compressor station. Most public access compressed natural gas stations are fast-fill, but they can cost $200,000 to $300,000 to build.

All of the above considerations notwithstanding, the number of alternative fuel refueling stations continues to increase. As of August 1, 1995, there were more than 1,100 compressed natural gas stations, 88 methanol stations, and 36 ethanol stations. The total number of alcohol and natural gas refueling sites for alternative fuels has more than quadrupled in the past five years. The Liquefied Petroleum Gas Clean Fuels Coalition recently estimated that there are now as many as 11,000 sites where propane can be obtained for this purpose.

Transit bus agencies and heavy-duty fleet operators generally install their own fueling stations and do not use public facilities.

The General Services Administration reports that, as a rule, alternative fuel vehicle maintenance was sometimes difficult in the early years of the program (1991–1992), but is no longer the problem it once was.

The infrastructure for alternative fuel vehicles is growing at a pace that parallels the number of alternative fuel vehicles being deployed. No significant impediment to further expansion is evident.

Vehicle Availability

The number of light-duty alternative fuel vehicles operating in U.S. Federal and non-Federal fleets has increased steadily over the past several years. The Energy Information Administration projects an increase in ethanol flexible-fuel vehicles to nearly 32,000 units in the near future because of an announcement that Chevrolet will manufacture an ethanol-compatible pickup truck.

Light-duty vehicles fueled by liquefied petroleum gas are estimated to be the largest group of vehicles in the United States operating on a fuel other than gasoline. The best information currently available puts the total at approximately 217,000 units.

In January 1995, a survey of transit bus agencies was conducted by the American Public Transit Association. The survey results indicate that, of the more than 52,000 buses currently in operation around the country, about 3 percent of them now operate on alternative fuels.

In 1995, the light-duty manufacturers offered six compressed natural gas models (including dedicated minivans, pickups, a dedicated van, a bi-fuel van, and a bi-fuel pickup), two 85 percent ethanol flexible-fuel sedans, and one liquefied petroleum gas heavy-duty truck. The models available in 1996 will include one 85 percent ethanol sedan, six compressed natural gas vehicles (including dedicated minivans, pickups, vans, and sedans), a bi-fuel van, a bi-fuel pickup, and one liquefied petroleum gas medium-duty truck.

The Energy Policy Act (42 U.S.C. 13212 (b) (1) (A)) mandates that 25 percent of all new vehicle purchases made in fiscal year 1996 by the Federal government must be alternative fuel vehicles. Based on projected vehicle acquisitions, the General Services Administration will be required to purchase approximately 8,600 units.

Information Dissemination

Information dissemination is an important component in the Department of Energy's program to expand the use of alternative fuels in the United States. Accurate, timely, and readily available information can only help to hasten public acceptance and adoption of alternative fuels and alternative fuel vehicles. The legislation requiring these activities includes the Alternative Motor Fuels Act of 1988, the Clean Air Act Amendments of 1990, the Energy Policy Act of 1992, and Executive Order 12844.

To make the best possible use of all the information being collected through the various vehicle demonstration programs, the Office of Alternative Fuels in the Department of Energy's Office of Transportation Technologies established the Alternative Fuels Data Center at the National Renewable Energy Laboratory. This center serves as the focal point for the information collected in all the vehicle demonstration programs. The Alternative Fuels Data Center maintains information on line in computerized databases, although hard copies are available as well, that are distributed through the National Alternative Fuels Hotline (1-800-423-1DOE). Several methods are available for accessing information in the Alternative Fuels Data Center. The primary method is via the World Wide Web on the Internet (http://www.afdc.doe.gov).