U.S. Department of Energy

Alternative Fuel Vehicles: Real-World Perspectives from the Federal Fleet

Introduction

Vehicles that run on fuels other than gasoline, or "alternative fuel" vehicles (AFVs), offer great promise for improving air quality and lessening our nation's dependence on imported oil. But if they are to fulfill this promise and replace traditional gasoline vehicles on a large scale, they must meet the needs of the people using them, and consumers must have access to "real-world" information about them. Do they drive as well as gasoline vehicles? Are their refueling stations as convenient as the corner gas station? Can we expect the same reliability that we've come to expect from our gasoline vehicles?

How better to answer these questions than to ask the people who are actually running the AFVs? So in 1996, the National Renewable Energy Laboratory (NREL), a U.S. Department of Energy (DOE) national laboratory, designed a nationwide study to capture the opinions of federal fleet managers and drivers on the performance, reliability, driveability, and acceptability of AFVs. NREL put together this short brochure to serve as a "quick look" summary of the surveys and their results (see the section entitled "For More Information" if you're interested in the details).

Fleet and Vehicle Characteristics

NREL selected the U.S. federal fleet for this survey because it contains a relatively large number of AFVs. In 1996, more than 19,000 "light-duty" AFVs—sedans, pickup trucks, and passenger/cargo vans—were being driven in regular service in the federal fleet (Energy Information Adminstration, 1996).

The primary types of AFVs in the federal fleet can be grouped by the alternative fuel used: ethanol (E85), methanol (M85), and compressed natural gas (CNG). Because there are very few federal fleet vehicles that run on liquefied petroleum gas (LPG), we did not include LPG vehicles in this group of surveys.

Most of the federal AFVs belong to the General Services Administration (GSA, which leases them to other agencies), the U.S. Department of Defense, and the U.S. Postal Service. GSA purchases AFVs almost exclusively from the original equipment manufacturers (OEMs); other agencies include aftermarket conversions in their fleets ("aftermarket conversion" refers to a vehicle that has been converted to run on the alternative fuel after it has left the factory).

The fleet managers we surveyed reported operating a total of 3956 AFVs in their fleets, which represented 8.6% of all their vehicles. Most respondents reported that they had 10 or fewer AFVs in their fleets. Fleet drivers noted that, more often than not, they are assigned the vehicles that they drive and are not given a choice of what vehicle they drive.

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Survey Design and Implementation

NREL developed the survey questionnaire, which included questions about AFV fuel use, subjective vehicle performance, and acceptability. To capture any potential seasonal differences, we conducted surveys in January, April, July, and October of 1996.

For the fleet manager study, we compiled the most complete list of fleet managers available from GSA and other sources. Although fleet managers were randomly selected from the contact list, we made an effort to choose participants from areas of the country where we knew that alternative fuels were available. This resulted in respondents from 26 states and the District of Columbia. During the survey of 275 fleet managers, a list of fleet driver names was compiled. From this list, we questioned 250 drivers per quarter, in 38 different states, for a total of 1,000 drivers. For various reasons, some of the surveys were excluded from the detailed analysis. As a result, we considered the comments of 273 fleet managers and 929 fleet drivers.

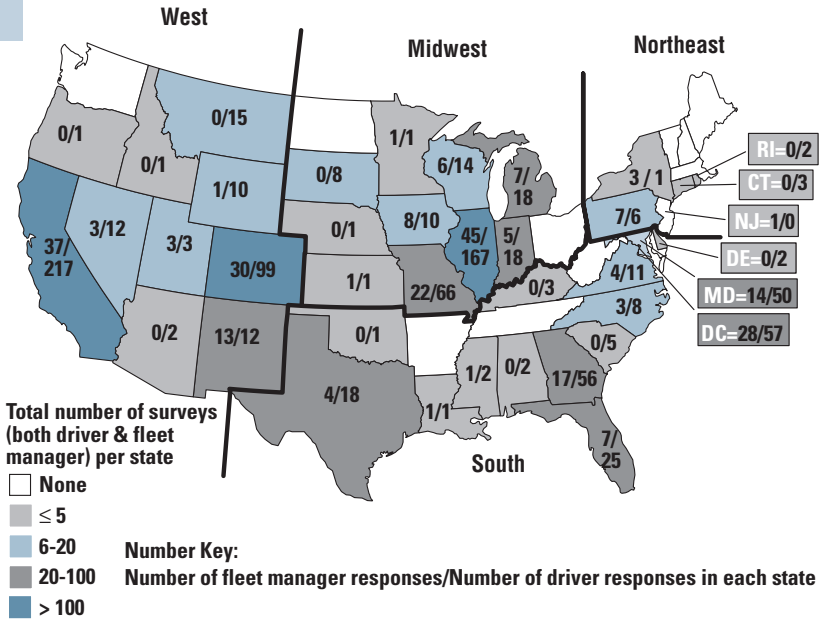


Figure 1. Number of fleet managers and drivers that responded to the surveys by state. Census regions are identified. No respondents were from Alaska or Hawaii.

Standard telephone interviewing techniques were used for both surveys. The staff of Petroleum Information/ Dwights LLC (formerly Dwights Energydata), an NREL subcontractor, conducted the fleet manager and the fleet driver interviews. All survey results were recorded on individual survey forms, and tabulated for analysis. All the data collected are available through DOE's Alternative Fuels Data Center (see section entitled "For More Information").

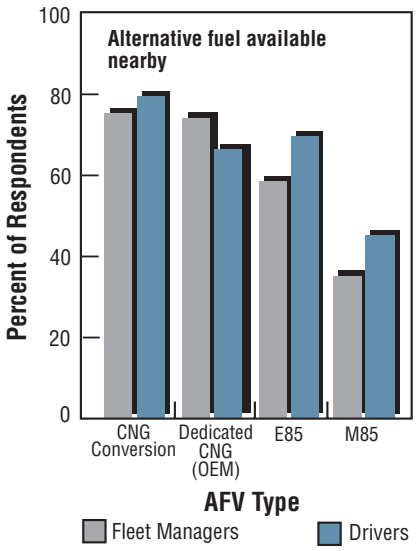
The fleet managers were asked about the performance of their AFVs compared to similar gasoline models. And the driver surveys included interviews with drivers of gasoline vehicles, which enabled a direct comparison to the responses from AFV drivers where appropriate.

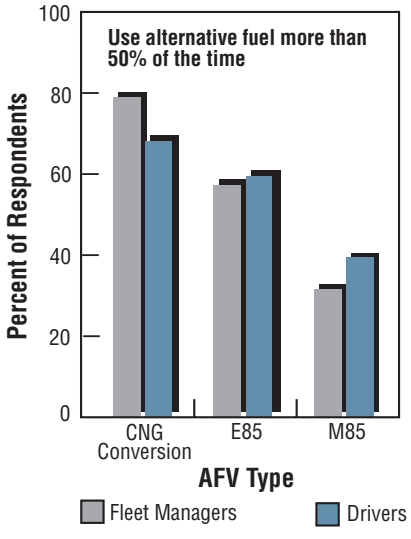
Selected Survey Results

Alternative Fuel Availability and Use. One hundred and sixteen of the fleet managers (just over 42%) reported that there was no alternative fuel station reasonably close by. It appears that fleet managers operating M85 vehicles as their primary AFVs have the most limited access to the alternative fuel; about 65% indicated that there is no alternative fuel station nearby. On the other hand, alternative fuel stations were reported to be reasonably close to 75% of respondents who operated CNG vehicles as their primary AFVs, and to 58% of respondents operating E85 vehicles as their primary AFVs.

The AFV drivers had a more optimistic view of alternative fuel availability, with 65% of the AFV drivers indicating that an alternative fuel station was within a reasonable distance. Again, this issue seemed to be more of a problem for drivers of M85 AFVs, because only about 46% said that M85 was available reasonably close by.

Figure 2. Comparative percentages of fleet managers' and AFV drivers' responses about fuel use in their vehicles (below left) and proximity of an alternative fuel station (below right).





Of the fleet managers surveyed, 78% whose primary AFV type is CNG conversions, about 58% whose primary type is E85, and about 31% whose primary AFV type is M85 indicated that their AFVs are usually fueled with the alternative fuel. Note that the percentages of fleet managers who say that their AFVs usually fuel with alternative fuel are nearly identical (by AFV type) to the percentages of those who indicated that the alternative fuel is nearby.

Ninety three percent of all drivers surveyed indicated that they refuel their own vehicles. For drivers of bi-fuel or flexible-fuel AFVs, the designated alternative fuel is not always the fuel of choice. About 64% of drivers of CNG conversions, 61% of E85 vehicles, and 40% of M85 vehicles reported that they refueled with the alternative fuel more than half the time.

Table 1. Driver and fleet manager performance-related complaints about AFVs

Performance–Related Problem	Driver reports by fuel**										Fleet manager reports by primary AFV type**									
	CNG-CON		CNG-OEM		E85		M85		Gasoline		CNG-CON		CNG-OEM		E85		M85		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Hard to start	16	40.0	7	36.8	3	30.0	5	27.7	0	0	3	50	1	33	2	40	1	20	7	37
Stall after starting	4	10.0	4	21.0	2	20.0	1	5.6	0	0	0	0	0	0	0	0	1	20	1	5
Stall in traffic	3	7.5	3	15.8	1	10.0	4	22.2	0	0	0	0	0	0	1	20	1	20	2	11
Poor idle	8	20.0	2	10.5	0	0	2	11.1	0	0	1	17	0	0	0	0	0	0	1	5
Hesitation	3	7.5	0	0	3	30.0	1	5.6	2	40.0	0	0	0	0	0	0	1	20	1	5
Lack of power	4	10.0	1	5.3	0	0	4	22.2	2	40.0	2	33	0	0	0	0	1	20	3	16
Engine ping	0	0	1	5.3	1	10.0	0	0	0	0	0	0	0	0	1	20	0	0	1	5
Check engine light on	2	5.0	1	5.3	0	0	1	5.6	1	20	0	0	2	67	1	20	0	0	3	16
Total	40	100	19	100	10	100	18	100	5	100	6	100	3	100	5	100	5	100	19	100
	Drivers reporting complaints*										Fleet managers receiving complaints*									
Number	28 of 191		14 of 175		8 of 186		17 of 193		3 of 184		4 of 29		3 of 77		4 of 83		3 of 84		14 of 273	
%	14.7		8.0		4.3		8.8		1.6		13.7		3.9		4.8		3.6		5.1	

* Several drivers and fleet managers reported multiple complaints about their vehicles, so numbers may not match above totals

** CNG-CON = CNG aftermarket conversion; CNG-OEM = dedicated CNG (OEM); E85 = flexible-fuel vehicle capable of operating on blends of ethanol and gasoline (up to 85% ethanol); M85 = flexible-fuel vehicle capable of operating on blends of methanol and gasoline (up to 85% methanol)

Performance, Reliability, and Maintenance. Of the fleet managers, more than 70% reported receiving the same number of complaints about the AFVs and the gasoline vehicles in their fleets. The fleet managers surveyed reported very few specific performance-related complaints, such as hard starting, stalling, hesitation, or lack of power, on the AFVs. Only 14 out of the 273 fleet managers (5.1%) reported receiving at least one of the performance-related complaints.

The drivers tended to be satisfied with the overall performance of their vehicles. More than 80% of drivers of gasoline or alcohol vehicles rated performance as very good or excellent, and more than 65% of drivers of CNG vehicles gave their vehicles very good or excellent marks. Specific complaints about vehicle performance were infrequent; only 70 of the 929 responses we included in the analysis reported at least one specific performance-related complaint. Most of the complaints were reported in interviews conducted during the winter months. This may indicate a seasonal effect, because performance problems such as hard starting and engine stalling tend to be more common in colder weather.

More than 90% of fleet managers surveyed reported no difference in the types or frequency of either scheduled or unscheduled maintenance between gasoline vehicles and AFVs. They also noted no difference in the amount of vehicle downtime.

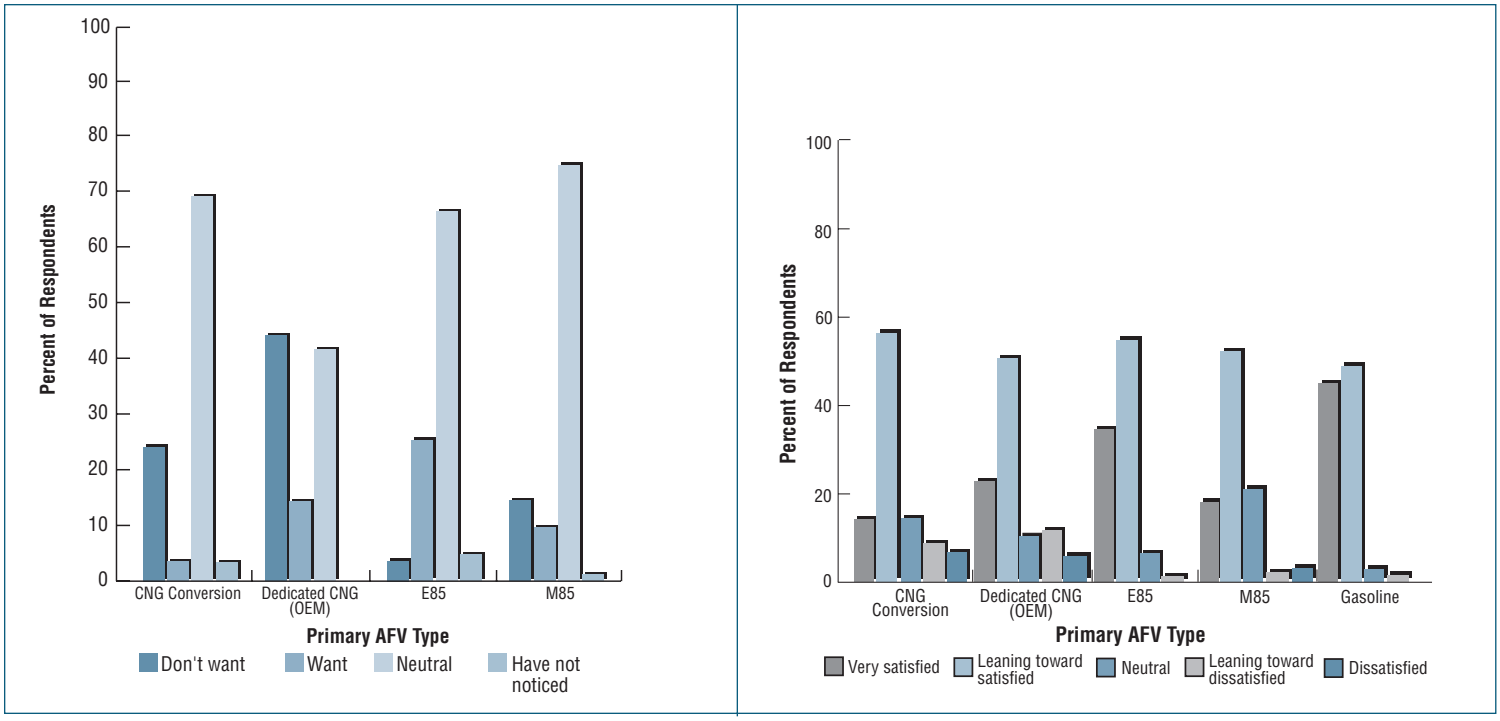


Figure 3. Fleet managers' responses to "How acceptable are AFVs to your drivers" (left) and drivers' ratings of overall satisfaction with their vehicles (right)

Acceptability. More than 62% of the fleet managers reported that their drivers were neutral about using AFVs. Fleet managers operating E85 vehicles as their primary AFVs reported the highest percentage of drivers who want to drive an AFV. Those operating OEM CNG vehicles had the smallest percentage reporting that their drivers want to drive an AFV.

Fleet managers cited few convenient fueling stations, the lack of available alternative fuel (particularly for alcohol AFVs), and limited vehicle range (primarily associated with CNG AFVs) as obstacles to AFV acceptability.

Drivers felt that fuel availability was a key obstacle to their acceptance of AFVs, particularly for the alcohol fuel vehicles. For the CNG vehicles, vehicle range seems to be the key barrier to acceptance.

All in all, 71% of the drivers said that they would recommend an AFV to other drivers.

Where Do We Go from Here?

As a result of improving vehicle technology, greater OEM production of AFVs, and governmental regulations requiring their use, light-duty AFVs continue to make inroads into fleets around the country—particularly local, state, and federal fleets. As we see from the survey results summarized here, fleet manager and driver experiences with AFVs to date have been mostly positive. Obstacles to their widespread acceptance appear to be surmountable. From the consumer's perspective, the most important issues to concentrate on appear to be improvements to increase vehicle range and enhance performance, along with infrastructure expansion. We plan another set of surveys to solicit feedback on AFVs from state and local governments, to document these experiences, and to compare them with the federal government experience.

For More Information

NREL has published detailed reports on both the fleet manager and fleet driver surveys. The reports are entitled, respectively, *Perspectives on AFVs: 1996 Federal Fleet Manager Survey* (NREL/TP-540-22720) and *Perspectives on AFVs: 1996 Survey of Drivers of Light-Duty Federal Fleet Vehicles* (NREL/BK-540-22721). For a copy of these reports, call the National Alternative Fuels Hotline at 1-800-423-1DOE or visit our site on the World Wide Web at *http://www.afdc.doe.gov*

Comparing AFVs to Similar Gasoline Vehicles—The Drivers Sum It Up

When asked to compare their AFVs to similar gasoline vehicles, the drivers' most common response was "the vehicles are about the same." Roughly 60%, 74%, and 62% of drivers of CNG, alcohol, and gasoline vehicles, respectively, responded in this way. Nearly 33% of gasoline vehicle drivers felt that their vehicles are better in comparison to AFVs. Only 6.9% of those operating CNG vehicles and 8.5% of those operating alcohol vehicles said their vehicles were better than similar gasoline models.

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