

## INTRODUCTION

The Department of Defense (DoD) strives to reduce its dependency on foreign oil and prevent pollution at its source. In response to the Energy Policy Act of 1992 (EPAct) and Executive Order (E.O.) 13149, “Greening the Government Through Federal Fleet and Transportation Efficiency,” DoD continues to purchase or lease alternative fueled vehicles (AFVs). The EPAct originally required that 25 percent of the vehicles that DoD acquires (purchases, leases, or converts) each year be AFVs. This percentage has increased since 1996 to the current goal of a 75 percent AFV acquisition rate. Although DoD has not met the required acquisition rate, the Department has made significant strides and expects to meet the AFV acquisition rate in FY 2003.

Alternative fuels not only reduce the Department’s and the nation’s reliance on foreign petroleum, they also help DoD comply with the increasingly stringent Federal, state, and local regulations on the emissions of particulate matter, nitrogen oxides, carbon monoxide, carbon dioxide, hydrocarbons, and sulfur oxides.

DoD is committed to displacing the use of petroleum products with alternative fuels and increasing the fleet’s mile per gallon fuel efficiency through the use of higher efficiency vehicles, such as hybrids. The DoD Components are taking innovative approaches to address the costs associated with AFV acquisition and alternative fuel infrastructure within their existing budgets. These approaches include using surcharges on leased vehicles to help fund the higher costs of AFVs; converting the existing petroleum infrastructure, where practicable, to alternative fuel, and working with the private sector to encourage investment and support through partnerships and financial grants. DoD also provides alternative fuels at a rate comparable to its petroleum counterpart through a slight surcharge on other fuels. These actions support the Department’s commitment to improving its alternative fueling infrastructure and acquisition of AFVs and will assist the Department to achieve the AFV acquisition goal in FY 2003.

## HIGHLIGHTS OF ACTIVITIES IN FISCAL YEAR 2002

DoD has made significant strides in its use of alternative fuels and its acquisition of AFVs. The Department has developed a strategic plan to comply with the requirements of E.O. 13149. DoD has also participated in initiatives to increase its overall fleet fuel efficiency.

In Fiscal Year (FY) 2002, DoD accepted a private donation of 495 neighborhood electric vehicles, worth \$4.6 million, for DoD installations in California. Requests for B20 biodiesel (20 percent biodiesel/80 percent diesel blend) through the Defense Energy Support Center have jumped 300 percent in one year. B20 requests increased from 1.4 million gallons to 5.4 million gallons. This increase also corresponds to the completion of a year-long test of B20 and the increasing number of existing fuel storage tanks being converted to B20 use.

DoD established an AFV working group, which includes personnel from each DoD Component and members of the environmental, fuel, transportation, and research offices. This working group identified areas where AFVs and related infrastructure would be of greatest advantage. The working group also identified ways for DoD's AFV program to move forward and to meet the challenges that lie ahead.

DoD's ability to develop and maintain a successful alternative fuel and AFV program relies on several factors, including the availability of AFV models that meet DoD requirements; the availability of a wide commercial and organic (on DoD installations) alternative fueling infrastructure; and, the availability of alternative fuels, such as biodiesel, ethanol, and compressed natural gas (CNG).

Overcoming the limited infrastructure is key to the success of the AFV program. Taking into account the limited commercial infrastructure, the Department is looking at excess fuel systems on its installations that can be quickly and inexpensively converted to alternative fuels. With all mechanisms in place, DoD could potentially reduce the Department's non-tactical overall petroleum fuel consumption by over 30 percent.

## E.O. 13149 AND ENERGY POLICY ACT COMPLIANCE STRATEGY

In FY 2002, DoD developed "The Department of Defense Compliance Strategy for Executive Order 13149 Alternative Fuel/Hybrid Vehicle Requirements." DoD developed this strategy as a guide for the DoD Components to improve their AFV programs and meet the requirements of E.O. 13149 and the EAct. Additionally, the document established guidelines to meet the requirements of the National Defense Authorization Act of 2002.

The strategy recognizes that the petroleum-based infrastructure, including vehicles and fueling systems, has evolved. The key objectives of the strategy are to—

- Meet the 75 percent AFV acquisition goal of the EAct
- Reduce vehicle petroleum consumption by 20 percent through FY 2005, from the FY 1999 baseline

- Increase the average fuel economy of the non-tactical vehicle fleet by 3 miles per gallon before the end of FY 2005
- Meet the National Defense Authorization Act hybrid light-duty truck acquisition goals of 5 percent in FY 2005 and 2006 and 10 percent in FY 2007 for EPOA-covered areas, and 100 percent for non-EPOA covered areas. Hybrid vehicles are those vehicles that use a conventionally fueled engine with an additional system that recovers braking energy, stores it, and uses the recovered energy to help accelerate the vehicle.

## ALTERNATIVE FUELS

Substitutes for traditional fossil fuels for vehicles include biodiesel, methanol, ethanol, natural gas, liquid propane gas, hydrogen, and hydrogen fuel cells. In addition to reducing dependence on foreign petroleum products, these alternative fuels can reduce emissions of nitrogen oxides, carbon monoxide, carbon dioxide, hydrocarbons, sulfur oxides, and particulate matter.

### BIODIESEL

Biodiesel is America's fastest-growing alternative fuel. Compared with petroleum-based diesel fuel, biodiesel reduces up to 90 percent of air toxins, 30 percent of hydrocarbons, 20 percent of carbon monoxide, and 15 percent of particulate matter. Biodiesel has also passed Clean Air Act health effects testing and is a registered alternative fuel with the U.S. Environmental Protection Agency. The Department of Agriculture has also determined that increased use of biodiesel will have a positive impact on the U.S. farm economy because there will be a higher demand for the crops used to create biodiesel.

The Defense Energy Support Center (DESC) awarded the government's first-ever long-term contract for B20. Under the contract, DESC will provide one million gallons of B20 at 17 government sites throughout the United States, allowing government fleets to obtain B20 just as easily as petroleum-based diesel. For the next contract, DESC has received requests for 5.4 million gallons of B20, approximately a 300 percent increase in demand. B20 will be available to both military and civilian fleets at various fueling sites throughout the country. Military bases participating in the program include Marine Corps Base Camp Lejeune, North Carolina; Marine Corps Air Station (MCAS) Miramar, California; and more than ten Air Force installations.

**FOCUS ON THE FIELD*****NAVAL FACILITIES DEVELOP NEW BIODIESEL PROCESS***

The Naval Facilities Engineering Service Center in Port Hueneme, California, is working with Biodiesel Industries and the Naval Air Warfare Center Weapons Division Point Mugu to demonstrate the production of biodiesel fuel from used cooking and vegetable oils. By not having to use virgin vegetable oils (such as soy oil), the process has distinct economic advantages over biodiesel production processes that require expensive virgin vegetable oils. The used cooking and vegetable oils are recycled, producing biodiesel and eliminating any solid waste disposal costs.

The field demonstration of this process will occur at Naval Base Ventura County, California. The Navy anticipates that the process will provide a cost-effective biodiesel production process.

## Other Alternative Fuels

DoD is working with industry to develop economical infrastructure to support alternative fuels. Grants from biofuel coalitions have supported installation projects for both ethanol and biodiesel. Recent advances in CNG fueling systems have reduced DoD's costs and increased installation flexibility.

The National Ethanol Vehicle Coalition provided the Military Components with a \$100,000 grant for the installation of ethanol (E-85) at four installations. The installations chosen to receive this money are Camp Lejeune, North Carolina; Public Works Center, Washington, DC; Wright-Patterson Air Force Base, Ohio; and Fort Bragg, North Carolina.

## FUEL EFFICIENCY

DoD possesses and continues to develop many technologies to improve fuel efficiency. Improving fuel efficiency will reduce the amount of petroleum fuels DoD uses and reduce the economic and environmental costs associated with the use of petroleum products. Ultimately, DoD will reap significant benefits as U.S. Armed Forces can be more easily deployed and vehicles can travel farther. In addition, the increased efficiency will allow DoD to deploy more forces and equipment at a lower cost.

## Hydrogen Fuel Cells

DoD is evaluating the possible use of fuel cells to reduce petroleum dependency. Fuel cell vehicles are powered by hydrogen, the most abundant element in the universe. Vehicles using this type of fuel are

virtually pollution and noise free. The byproduct of hydrogen fuel cells is non-polluting steam, which can be reused to produce additional hydrogen. As the technology advances, DoD plans to introduce hydrogen fuel cell powered vehicles to its non-tactical fleet.

Among the biggest challenges to using vehicles powered by hydrogen fuel cells is their lack of market production and availability and the limited fueling infrastructure. For DoD to successfully integrate hydrogen fuel cell vehicles into its fleet, hydrogen filling stations must be available and accessible for refueling. The benefit of fuel cell vehicles is fuel economy. However, current hydrogen storage technology limits the range for hydrogen vehicles.

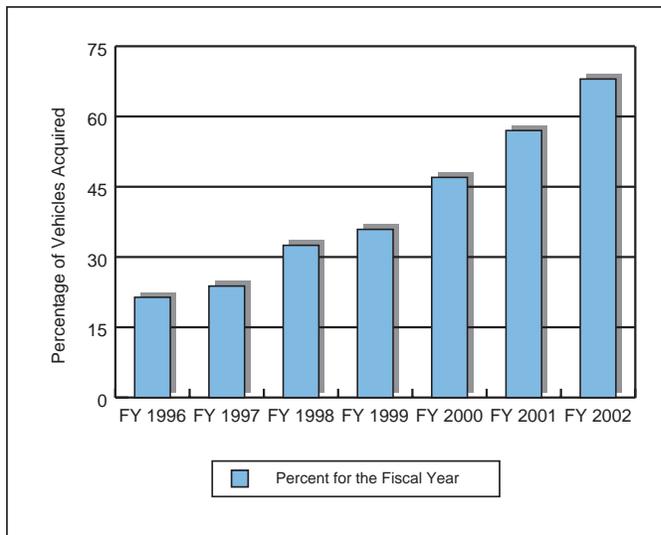
### Electric Vehicles

DoD is also using electric vehicles (EVs) to reduce its dependence on fossil fuels. Electric vehicles reduce emissions and lower petroleum consumption. Most EVs are available in a variety of configurations and can carry two to four passengers. At some DoD installations, such as Luke Air Force Base, Arizona, EVs have effectively replaced standard petroleum-burning sedans and pickup trucks normally used on the base.

In FY 2002, Daimler Chrysler donated 495 non-tactical electric vehicles worth approximately \$4.5 million to DoD. One hundred ninety one of these vehicles went to the Army, 77 to the Navy, 115 to the Marine Corps, and 112 to the Air Force. By partnering with industry, DoD can continue to enhance its AFV fleet.

### ACQUISITION OF ALTERNATIVE FUELED VEHICLES

**Figure 15**  
**Percent of Alternative Fueled Vehicles Acquired**



DoD continues to add to its fleet of alternative fueled vehicles. In FY 2002, 68 percent of the vehicles that DoD acquired were AFVs (Figure 15). DoD’s greatest challenges in acquiring AFVs are the availability of the types of vehicles the military needs and the alternative fueling infrastructure.

In FY 2002, the Army made an 11 percent improvement towards meeting the 75 percent goal, acquiring 2,843 of the 4,777 AFV credits, or 60 percent. The Army expects to meet the

75 percent goal in FY 2003 through leasing AFVs and with extensive biodiesel credits. The Army has provided funding to install both biodiesel and ethanol fuel tanks at Fort Leonard Wood, Missouri, and contributed funds to place a biodiesel fuel tank at the Navy Exchange Service Station near the Pentagon. The Army continues to develop an alternative refueling infrastructure.

Overall, the Department of the Navy achieved a 98 percent acquisition rate for FY 2002. Separating the Navy and the Marine Corps, the Navy acquired 1,140 AFVs in FY 2002. With credits, the Navy achieved a 68 percent rate for FY 2002. The Navy plans to meet the 75 percent target in FY 2003, and achieve an even higher level in FY 2004. The Navy installed two CNG fuel pumps at Public Works Center (PWC) Jacksonville, Florida. The Navy also converted an existing gasoline station to an ethanol refueling station at PWC Great Lakes, Illinois.

In FY 2002, the Marine Corps acquired 512 AFVs and 350 additional credits for AFVs and biodiesel use. This gave the Marine Corps a “Government Best” rate of 182 percent. The Marine Corps continues to concentrate its CNG vehicles where CNG infrastructure already exists. The Marine Corps expanded this infrastructure at MCAS Yuma, Arizona. The installation also received the Department of Energy’s Energy Reduction Award based on fuel reductions achieved through the use of neighborhood EVs.

In FY 2002, the Air Force increased its percentage of AFVs acquired by 13 percent with 772 AFV vehicles and 287 additional credits, a 59 percent acquisition rate. The Air Force plans to significantly improve its level of compliance in FY 2003 through the increased use of biodiesel. Scott Air Force Base, Illinois, completed a successful year-long biodiesel test. All diesel-powered vehicles at the installation are now using biodiesel, including fire trucks and ambulances. The Air Force is also maintaining its existing CNG infrastructure and expanding it where practical.

In FY 2002, DoD closed the gap in reaching the 75 percent goal by attaining a 68 percent AFV acquisition rate. This is a 14 percent increase from FY 2001 and a 32 percent increase since 1999. The Department will continue to overcome the lack of commercial refueling infrastructure through the conversion of excess fuel tanks, new construction when funds are available, and through partnerships. With the increase in the Department’s B20 infrastructure and gaining an AFV credit for every 2,250 gallons of B20 used, DoD has the opportunity to surpass the AFV acquisition goal in the near future.

The automotive industry continues to develop additional AFVs and hybrid models. With these new models, DoD will be better able to tailor its vehicle fleet to the available fuel infrastructure. The national AFV fueling infrastructure is slowly being enhanced. As it grows, the need for the DoD to create its own infrastructure will decrease and the opportunity for increased alternative fuel use will benefit both the Department and the nation.