Report to Congress

Review of Energy Policy Act of 1992 Programs and the Alternative Fuel Provider Fleet Mandate

Prepared in Compliance with
Sections 704 and 1831 of the Energy Policy Act of 2005
and Section 501 of the Energy Policy Act of 1992

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Executive Summary

In August 2005, President George W. Bush signed the Energy Policy Act of 2005 (EPACT 2005; Pub.L. No. 109-58), which amends the alternative fuel provisions in the Energy Policy Act of 1992 (EPACT 1992; Pub. L. No. 102-486). Specifically, Sections 704 and 1831 of EPACT 2005 require the U.S. Department of Energy (DOE) to complete a report that determines the impacts Titles III, IV, and V of EPACT 1992 (42 U.S.C. 13211-13264) have had on the:

- Development of alternative fueled vehicle (AFV) technology;
- Availability of that technology in the market; and
- Cost of AFVs.

EPACT 1992 provides the authority for several alternative fueled fleet activities within Titles III through V (42 U.S.C. 13211-13264). The primary purpose of these mandatory and voluntary fleet activities is to promote replacement fuels to the maximum extent practicable. Title III establishes AFV acquisition requirements for Federal fleets, and includes a number of basic definitions applicable to all EPACT 1992 fleet activities (42 U.S.C. 13211 et seq.). Title IV focuses on non-Federal programs, such as information programs, data collection, and incentives (42 U.S.C. 6374, and 42 U.S.C. 13231 et seq.). Title V establishes non-Federal AFV acquisition programs, including mandatory programs for Alternative Fuel Provider (AFP) and State fleets, and conditional programs for private and local government fleets (42 U.S.C. 13251 et seq.). Title V (in conjunction with Title IV) provides the basis of DOE's Office of Energy Efficiency and Renewable Energy (EERE) Clean Cities activity.

In combination, these programs are mutually reinforcing, because the Clean Cities voluntary efforts help regulated fleets deploy AFVs and alternative fuels, and the regulated fleets serve as a springboard for the voluntary alternative fuel-related efforts. Overall, the EPACT programs displace hundreds of millions of gallons of petroleum annually. This amount, however, is less than one percent of the approximately 175 billion gallons of petroleum used on the nation's highways annually.

Covered EPACT fleets have generally met or exceeded EPACT 1992 AFV-acquisition requirements. Cumulatively they have purchased nearly 200,000 AFVs between 1992 and 2005-2006.[1] Voluntary fleets have also acquired more than 290,000 AFVs.[2] These achievements, however, have a limited impact on petroleum replacement. Together, the total 2006 U.S. inventory of 635,000[3] mandatory and voluntary AFVs and represents less than 1 percent of the

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[1] Federal fleet data submitted to the Federal Automotive Statistical Tool (FAST) through FY2005 (compliance submittals); State and AFP fleet data submitted through 2006 (annual compliance reports); and Clean Cities data reported by program stakeholders (includes some light-duty AFVs in regulated fleets).

[2] Figure based on data Federal, state, AFP, and Clean Cities stakeholder fleets have submitted. *See infra* Table 1.

[3] Energy Information Administration, "Estimated Number of Alternative Fueled Vehicles in Use in the United States, by Fuel Type, 2003 – 2006", http://www.eia.doe.gov/cneaf/alternate/page/atftables/afvtrans_v1.xls (Dec. 8, 2008) (EIA's estimates are

nearly 251 million[4] vehicles on U.S. roads in 2006. Combined, the Clean Cities program, which also includes hybrid electric vehicles, low-level blends of alternative fuel, idle reduction technologies, and other fuel economy measures, and the AFV fleets have cumulatively displaced more than 1.6 billion gasoline gallon equivalents (GGE) of petroleum between 1992 and 2006,[5] or only less than 1 percent of highway motor fuel usage during 2006 alone.

Currently, the public has a greater choice of AFV models than existed in 1993. However, the impact of EPACT fleet programs on development of AFV technologies and on the availability of AFV technologies in the market is uncertain. MY 1993 Original Equipment Manufacturers (OEM) offerings included 12 AFV models, mostly in limited volumes, whereas MY 2008 offerings exceeded 33 different AFV models.[6] DOE believes that by serving as launching pads for and opportunities to debug alternative fuel technologies, the EPACT programs have contributed to the development of the AFV technologies available for public purchase today.

The precise extent to which EPACT 1992 has affected the AFV and alternative fuel markets is not readily measurable, because other factors—such as the price of oil and the availability of corporate average fuel economy (CAFE) credits for AFVs—have affected AFV and infrastructure development. However, since EPACT 1992 was enacted, there has been steady growth and changes in the alternative fuel infrastructure and vehicle markets. One specific area that DOE believes the fleet programs were a direct catalyst was in the development of the biodiesel market.

The costs for AFV technology have declined since EPACT was enacted, but it is not clear how much the EPACT 1992 programs have contributed directly to this decline. Regulated and voluntary fleets have acquired thousands of AFVs, however, demand for AFVs as a result of the EPACT 1992 programs probably have not been large enough to affect the cost of AFVs. OEMs have developed and produced more than six million flex fuel vehicles (FFV) in several different models, most likely in response to the Corporate Average Fuel Economy (CAFE) program (49 U.S.C. 32901 et seq.). The cost differential now is negligible to non-existent for certain ethanol technologies, because there is minimal hardware changes required for FFVs and there exists available CAFE credit value for FFVs.[7] The price differentials remain for the other technologies.

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often greater that vehicle counts because EIA estimates capture users not necessarily reporting under regulatory or Clean Cities processes).

4 Bureau of Transportation Statistics, "Number of U.S. Aircraft, Vehicles, Vessels, and Other Conveyances", http://www.bts.gov/publications/national_transportation_statistics/html/table_01_11.html (Dec. 8, 2008).

5 Estimated fuel use based on Clean Cities annual questionnaire results.

6 U.S. DOE, Energy Efficiency and Renewable Energy, Alternative Fuels & Advanced Vehicles Data Center, "OEM AFV/HEV/Diesel Light Duty Model Offerings by Fuel Type 1991-2008", at http://www.afdc.energy.gov/afdc/data/docs/afv_models_fuel_type.xls (Dec. 9, 2008).

7 Congressional Research Service, Alternative Transportation Fuels and Vehicles: Energy, Environment, and Development Issues, (Jan. 2005).

DOE is uncertain as to the impact EPACT 2005 will have on AFV technology development. As many EPACT 2005 provisions are only now beginning to be implemented, it will take time to assess the complete gains of the EPACT 2005 programs.

Although the EPACT vehicle programs are not large enough to catalyze the market for AFVs in terms of the total number of vehicles and the number of model offerings, DOE believes that these fleet programs continue to demonstrate the practicality and benefits of alternative fuels to the communities in which these fleets operate. The programs educate fleet operators and other consumers on these technologies and set the stage for expansion into the broader marketplace. The EPACT fleet programs have also provided, and continue to provide, an opportunity to develop acceptance of diverse fuels and technologies on the part of Federal, State, and AFP fleets. The programs also reveal obstacles to deploying more AFVs and ensuring a diverse fuel supply for the U.S. vehicular transportation sector. Fleet programs help grow infrastructure and help ensure OEMs are developing AFVs.

Introduction

Congress passed the Energy Policy Act of 1992 (EPACT 1992; Pub. L. No. 102-486) to facilitate the introduction of alternative fueled vehicles (AFVs) and replacement fuels into the U.S. transportation sector and to improve air quality. Portions of EPACT 1992 were designed to encourage the use of non-petroleum alternative motor fuels to reduce dependence on imported oil in transportation. Congress established regulatory requirements for certain fleets to purchase light-duty AFVs.

In August 2005, President George W. Bush signed the Energy Policy Act of 2005 (EPACT 2005; Pub. L. No. 109-58), which, in part, amends the alternative fuel provisions in EPACT 1992. Additionally, Sections 704 and 1831 of EPACT 2005[8] require the U.S. Department of Energy (DOE) to complete a report that determines the impacts Titles III, IV, and V of EPACT 1992 (42 U.S.C. 13211 et seq.) have had on the :

- Development of AFV technology;
- Availability of that technology in the market; and
- Cost of AFVs.

In particular, the report must examine the compliance activity of fleets covered under EPACT 1992. Details must include the:

- Number of AFVs fleets have acquired;
- Amount and type of alternative fuel actually used in AFVs acquired by covered fleets;
- Amount of petroleum covered fleets displaced;
- Costs of fleet compliance with EPACT 1992;
- Obstacles to fleet compliance with EPACT 1992 and the use of alternative fuels; and
- Projected impacts of EPACT 2005 amendments to the program.

This report satisfies all of these requirements, as well as the requirements of Section 501(d) of EPACT 1992, which requires DOE to prepare a summary of covered alternative fuel provider (AFP) fleet activity [42 U.S.C. 13251(d)]. Details of the Section 501 report must include the:

- Actions taken to carry out Section 501 of EPACT 1992;
- Progress made toward this section's requirements; and
- Problems encountered in the implementation of this section's requirements.

Sections 704 and 1831 of EPACT 2005 and Section 501 of EPACT 1992 are provided in the Appendix to this report.

[8] Sections 704 and 1831 of EPAct 2005 contain identical requirements.

Overview of EPACT 1992 Titles III-V

Titles III, IV, and V of EPACT 1992 include mandatory and voluntary measures to promote replacement fuels to the maximum extent practicable and to reduce U.S. dependence on imported oil (42 U.S.C. 13211-13264). DOE implements these requirements through EPACT 1992 fleet activities and the Office of Energy Efficiency and Renewable Energy (EERE) Clean Cities activity, which support each other in achieving national objectives.

EPACT 1992 fleet acquisition requirements apply to Federal agency, state government, and AFP fleets located primarily in major metropolitan areas. EPACT 1992 also provided that private and local government fleets would be subjected to EPACT 1992 fleet acquisition requirements if DOE determined that such a fleet rule was necessary to meet the Replacement Fuel Goal [42 U.S.C. 13257(e)]. The primary method of compliance for these regulated fleets, as provided by EPACT 1992, is the acquisition of AFVs. Over the years, additional options have been added, providing greater flexibility for fleets.

Title III

Termed "Alternative Fuels—General," Title III of EPACT 1992 includes key definitions that apply to the fleet programs in Titles III-V. The first of these is the definition of "alternative fuel", which includes a list of most of the commonly-known alternative fuels, including biofuels (e.g., ethanol), natural gas, hydrogen, electricity, and propane, among others, and which authorizes DOE to designate additional fuels as "alternative" or "replacement" if certain conditions are met [42 U.S.C. 13211(2) and (14)]. Since EPACT 1992 was enacted, two additional fuels have been designated as alternative fuels: biodiesel (as a neat fuel) and P-series fuel.[9]

Of major importance to the fleet programs, Title III also defines the characteristics of a covered fleet. Covered State and AFP fleets include those that have 50 or more light-duty vehicles (LDVs)[10]—20 in the case of Federal agencies[11]—of which at least 20 are centrally fueled or "capable of being centrally fueled" and are primarily operated in a single Metropolitan Statistical Area/Consolidated Metropolitan Statistical Area (MSA/CMSA) with a 1980 population of more than 250,000 [42 U.S.C. 13211(5)]. In determining the number of vehicles in a fleet, vehicles heavier than 8,500 pounds (lbs) gross vehicle weight rating or that are not located or operated primarily in a covered MSA/CMSA, are not included. Law enforcement, emergency, military tactical vehicles, vehicles employees take home at night, and certain other special categories of

[9] P-Series fuel is a blend of natural gas liquids (pentanes plus), ethanol, and the biomass-derived co-solvent methyltetrahydrofuran. P-Series fuels are clear, colorless, 89-93 octane, liquid blends that are formulated to be used in flexible fuel vehicles (FFVs). P-Series fuel can be used alone or freely mixed with gasoline in any proportion inside an FFV fuel tank. Currently, P-Series is not being produced in large quantities and is not widely used.

[10] EPACT 1992, §301(5)(B).

[11] EPACT 1992, §303(b)(3).

vehicles are also excluded [42 U.S.C. 13211(9)]. The excluded vehicles are also not subject to the AFV acquisition requirements when the vehicles are replaced.

While the statute does not expressly address the treatment of AFV acquisition outside of a Federal fleet, guidance provided by DOE encourages Federal agencies to purchase AFVs in areas where vehicles are not subject to the requirement and in excess of the requirement. Federal agencies have exceeded the required AFV acquisitions. Additionally, if the vehicles are counted towards AFV credits, they become subject to EISA Section 701, which requires them to use alternative fuel.

Section 707 of EPACT 2005 amended EPACT 1992 by expanding the scope of emergency vehicles excluded from coverage to include those used to repair transmission lines and restore electric service, as determined by the Secretary of Energy [42 U.S.C. 13211(9)(E)].

Title III, specifically Sections 302(a)(1)(E) and 303 of EPACT 1992, also sets forth the statutory requirements for Federal agency use of alternative fuels in, and the acquisition of, light duty AFVs (42 U.S.C. 6374 and 42 U.S.C. 13212). Section 303 requires Federal fleets to acquire AFVs; for fiscal year (FY) 1999 and beyond, 75 percent of a covered Federal fleet's annual LDV acquisitions must be AFVs (42 U.S.C. 13212).

EPACT 1992 Section 302(a)(1)(E) requires Federal agencies to use alternative fuel in dual-fuel AFVs unless the Secretary of Energy "determines that operation on such alternative fuels is not feasible" [42 U.S.C. 13212(a)(1)(E)]. Although the Secretary has not made an official determination regarding the availability of alternative fuels, DOE acknowledges that this requirement has been difficult for many Federal fleets to meet due to the limited alternative fuel infrastructure.

Section 7 of the Energy Conservation Reauthorization Act of 1998 (Pub. L. No. 105-388) added biodiesel as a compliance option for covered fleets (42 U.S.C. 13220). This provision provides fleets one AFV acquisition credit for every 450 gallons of neat (100 percent) biodiesel purchased for use by fleets for use in medium- or heavy-duty vehicles (HDVs). There are some limitations, however. The biodiesel must be used in blends of at least 20 percent biodiesel (B20), and fleets can only use biodiesel to meet up to 50 percent of their acquisition requirements. Unlike credits generated by AFV acquisitions, fleets cannot bank or trade credits earned under these biodiesel provisions. Fleets were able to begin using biodiesel as a compliance option during 1999.

Federal Fleets

In January 2007, President George W. Bush issued Executive Order (E.O.) 13423,[12] which directs Federal fleets to continue previous direction to reduce petroleum use by two percent per year and increase alternative fuel consumption by 10 percent per year through FY 2015 as compared with FY 2005 baseline values (72 FR 3919; January 24, 2007). Section 2g of E.O.

[12] E.O. 13423 replaced E.O. 13149, which President Bush signed in April 2000. E.O. 13149 reinforced EPACT 1992 by directing Federal agencies to reduce petroleum consumption by 20 percent in their fleets and by requiring the use of alternative fuels in AFVs. 65 FR 24607 (April 26, 2000).

13423 also calls for Federal fleets to acquire plug-in hybrid electric vehicles (PHEV) when commercially available at a cost reasonably comparable, on a life-cycle basis, to non-PHEVs. DOE implements Sections 302(a)(1)(E) and 303 of EPACT 1992 and E.O. 13423 through its Federal fleet activities.[13]

Section 701 of EPACT 2005 amended the Federal fleet acquisition requirements by requiring the use of alternative fuels in dual-fuel vehicles unless the Secretary of Energy determines an agency qualifies for a waiver [42 U.S.C. 6374(a)(3)(E)]. Waivers are permitted if alternative fuel is not reasonably available to the fleet in a particular geographic area, or if the cost of the alternative fuel is unreasonably more expensive than conventional fuel on a per-gallon basis.

In FY 2005, the Federal fleet acquired 16,947 AFVs—compared with a total of 18,594 LDV acquisitions covered by EPACT 1992—and earned an additional 3,328 credits (for acquisition of dedicated AFVs and the use of biodiesel), for a total of 20,275 credits.[14] This level of acquisition corresponds to 109 percent of the covered LDV acquisitions, far exceeding the 75 percent requirement. In comparison, in FY 2005, the Federal fleet consisted of a total of 484,946 LDVs[15] (both covered and non-covered), of which 93,298[16] (19 percent) were AFVs.

Title IV

Termed "Alternative Fuels—Non-Federal Programs," Title IV of EPACT 1992 authorizes a wide range of activities focused on replacement fuels and AFVs (42 U.S.C. 6374 and 42 U.S.C. 13231 et seq.). Title IV includes programs focused on alternative fuel trucks and buses, public information, state and local incentives, and technician training. The public information program (42 U.S.C. 13231) and the state and local incentive program (42 U.S.C. 13235), along with Section 505 in Title V (42 U.S.C. 13255), form the basis for the Clean Cities program activities. In addition, Section 411 authorizes the development of certified AFV technician training programs, currently being implemented through the National Automotive Fuels Training Consortium at West Virginia University (42 U.S.C.13237). EPACT 2005 did not amend this title of EPACT 1992.

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[13] Congress incorporated the petroleum reduction and alternative fuel use requirements of E.O. 13423 into the Energy Independence and Security Act (EISA) of 2007, Section 142 (Pub. L. No. 110-140).

[14] U.S. DOE, Energy Efficiency and Renewable Energy, Federal Energy Management Program, Transportation Services, Data Collection and Annual Reports, "Federal Fleet Compliance with EPACT and E.O. 13149: Fiscal Year 2005", available at http://www1.eere.energy.gov/vehiclesandfuels/epact/pdfs/2005_fed_fleet_report.pdf (Dec. 9, 2008).

[15] Federal Automotive Statistical Tool, *Query Results: Section I Inventory and Acquisition Data (All Agencies, FY2005, LD),* December 2008.

[16] Federal Automotive Statistical Tool, *Query Results: Section I Inventory and Acquisition Data (All Agencies, FY2005, LD, AFVs),* December 2008.

Title V

Titled "Availability and Use of Replacement Fuels, Alternative Fuels, and Alternative Fueled Private Vehicles," Title V of EPACT 1992 includes AFV acquisition requirements for the following entities: AFPs, state governments, private companies, and local governments. The provisions for State and AFP fleets are mandatory, while the acquisition requirements for private and local government fleets are conditioned on DOE making certain findings regarding the necessity of such requirements (42 U.S.C. 13251 et seq.). Title V also includes several voluntary initiatives to increase the use of AFVs and alternative fuels (42 U.S.C. 13255). In addition, Title V Section 502(b)(2) set replacement fuel production goals for the motor fuels sector (10 percent in 2000, 30 percent in 2010) [42 U.S.C. 13252(b)(2)]. Section 504(b) authorizes DOE to modify the goals, if necessary [42 U.S.C. 13254(b)].

State and Alternative Fuel Provider Rule

Section 501 of EPACT 1992 directed DOE to develop regulations requiring AFP fleets to acquire light-duty AFVs (42 U.S.C. 13251; see 10 C.F.R. Part 490). As of 2001, 90 percent of LDVs acquired by covered AFP fleets must be AFVs. Currently 166 AFPs—including electric and natural gas utilities and a few propane distributors—must comply with this requirement. Some of the AFP fleets covered by this requirement comply as a single entity but actually represent several individual companies. Through model year (MY) 2006, covered AFP entities acquired 26,797 AFVs.[17]

Section 507(o) of EPACT 1992 directed DOE to develop regulations requiring state government fleets to acquire AFVs [42 U.S.C. 13257(o); see 10 CFR Part 490]. As of 2001, 75 percent of new LDVs for covered state fleets must be AFVs. One hundred and forty-eight state entities are subject to this requirement, and through MY 2006 acquired 78,644 AFVs.[18] The number of state fleets complying with the requirements is actually much higher because many states submit a single state-wide report or submit consolidated annual reports. DOE implements the requirements of Sections 501 and 507(o) of EPACT 1992 through the state and AFP rules. The regulations for these provisions are found in 10 CFR Part 490.

Section 703 of EPACT 2005 added Section 513a to EPACT 1992, which directs DOE to develop an Alternative Compliance provision (42 U.S.C. 13263a). The Alternative Compliance provision allows covered state government and AFP fleets to request waivers in lieu of purchasing AFVs. To receive a waiver, fleets must demonstrate to DOE that they will achieve petroleum use reductions equivalent to running their AFVs on alternative fuels 100 percent of the time. A final rule implementing the Alternative Compliance provision was published in the *Federal Register* on March 20, 2007 (72 FR 12958). MY 2008 is the first year for which covered fleets may use the alternative compliance option.

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17 *See* U.S. DOE, Energy Efficiency and Renewable Energy, Vehicle Technologies Program, EPAct Resources, Annual Reports, available at http://www1.eere.energy.gov/vehiclesandfuels/epact/state/state_resources.html#annual (Dec. 9, 2008).

18 *Id.*

Section 133 of EISA added a list of electric drive vehicle technologies that DOE is required to allocate credits for, including hybrid electric vehicles (HEVs), PHEVs, and others. DOE has begun a rulemaking to implement this requirement.

Replacement Fuel Goal

EPACT 1992 Section 502(a) directed DOE to establish a replacement fuel program [42 U.S.C. 13252(a)]. The Replacement Fuel Program is comprised of all DOE's activities under Titles III, IV, and V of EPACT 1992. The purpose of this program is to "promote the replacement of petroleum motor fuels with replacement fuels to the maximum extent practicable" [42 U.S.C. 13252(a)]. Per Section 502(b)(2), the focus of the program is on expanding replacement fuels production capacity [42 U.S.C. 13252(b)(2)]. Further, Section 502(b)(2) specifies an interim Replacement Fuel Goal of producing sufficient replacement fuels to replace 10 percent by 2000 of the projected consumption of motor fuels in the U.S., with a final goal of 30 percent by 2010 [42 U.S.C. 13252(b)(2)]. Under Section 504, DOE was tasked with evaluating these goals. If DOE finds the goals to be unachievable, then DOE is directed to modify the goals so that they are achievable [42 U.S.C. 13254(a) and (b)]. In modifying the goals, DOE can either modify the goal percentage or timeframe or both. However, DOE must balance various considerations to establish goals that are "achievable" and that promote replacement fuels to the "maximum extent possible" while remaining technologically and economically feasible [42 U.S.C. 13254(b)].

On March 6, 2007, DOE adopted a revised replacement fuel goal (72 FR 12041; Mar. 15, 2007). DOE determined through its analysis that the 30 percent Replacement Fuel Goal cannot be met by 2010, as established by Section 502(b)(2)(B). DOE determined that the 30 percent goal can be achieved by 2030, and revised the replacement fuel goal accordingly.

Private and Local Government Rule

Section 507(e) of EPACT 1992 instructed DOE to determine whether private and local government fleets should be required to acquire AFVs [42 U.S.C. 13257(e)]. Unlike mandates for Federal agency, state government, and AFP fleets, the regulation of private and local government fleets was conditioned upon DOE determining that the fleet mandate was "necessary" to achieve the replacement fuel goals contained in Section 502(b)(2) of EPACT 1992 [42 U.S.C. 13257(e)(1)]. If the private and local government fleet mandate was implemented, DOE estimated that the program would most likely result in the required acquisition of a maximum of an additional 150,000 to slightly over 600,000 AFVs annually (73 FR 13729, 13736; March 14, 2008). If DOE determined that a private and local government fleet rule was not necessary, then Section 509 of EPACT 1992 directed DOE to prepare a report including recommendations to Congress within two years of publishing such a determination (42 U.S.C. 13259).

On March 6, 2008, DOE issued its decision not to implement an AFV acquisition mandate for private and local government fleets (73 FR 13729; March 14, 2008). DOE made this determination based upon the requirement that DOE could only implement the Private and Local Government Fleet rule if DOE found that the Replacement Fuel Goal could not be met without such a Private and Local Government Fleet rule. DOE found that the Replacement Fuel Goal could be achieved without the rule. The decision was also supported with additional analyses

that indicated the addition of the private and local government fleet acquisition requirements would likely result in a negligible replacement of U.S. motor fuel use, specifically, a maximum of 0.2 percent (73 FR 13729, 13735; March 14, 2008). DOE determined that this finding precluded it from determining that the imposition of requirements was "necessary" to achieving the replacement fuel goal of 30 percent replacement by 2030, particularly given the extended time to meet the replacement fuel goal, noted above, and the scheduled CAFE standard improvements (73 FR 13729, 13739; March 14, 2008).

Credit Program

Section 508 of EPACT 1992 provides for a credit program for Title V fleets (42 U.S.C. 13258). Under this provision, fleets that acquired AFVs in excess of requirements, or prior to requirements, receive acquisition credits. Fleets may then bank these credits for application to later years' requirements, or sell or trade the credits to other fleets. Thus, this provision provides a certain amount of flexibility for fleets. The credit provision was included within the Alternative Fuel Transportation Program (10 C.F.R. Part 490, Subpart F).

Clean Cities

Initiated in 1993 (primarily under EPACT 1992 Section 505), Clean Cities, a voluntary, locally based initiative, provides a framework for government and industry to partner with local stakeholders and expand the use of alternative fuel, AFVs, and other petroleum use-reduction technologies. Clean Cities stakeholders include state and local governments, private fleets, fuel providers and associations, vehicle and transportation equipment manufacturers, and others.

Since its inception, Clean Cities has made steady progress in promoting the voluntary use of alternative fuel and vehicle efficiency in the transportation sector. The number of Clean Cities coalitions has grown to almost 90 (covering 63 percent of the U.S. population) and the number of stakeholders has expanded to more than 5,700.[19]

The focus of these coalitions is to obtain voluntary commitments from fuel suppliers to make replacement fuels available, vehicle manufacturers to make AFVs available, and from fleet owners to acquire AFVs and fill those AFVs with alternative fuels. Since 1993, Clean Cities coalitions and stakeholders displaced more than 1.6 billion gallons of petroleum through the acquisition and use of AFVs, and the implementation of HEVs, low-level blends of alternative fuel, idle reduction technologies, and fuel economy measures. In 2007 alone, roughly 375 million gallons of petroleum were displaced as the result of coalition activities. Clean Cities and its coalitions are on track to reach 2.9 billion gallons of petroleum displaced per year in 2020, exceeding by 400 million gallons the Clean Cities' goal of 2.5 billion gallons per year.[20] Still, this amount is less than 1 percent of highway motor fuel usage during 2006 alone.

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[19] *See* U.S. DOE, Energy Efficiency and Renewable Energy, Clean Cities, Accomplishments, available at http://www1.eere.energy.gov/cleancities/accomplishments.html (Dec. 9, 2008).

[20] *Id*.

DOE believes that a portion of the Clean City petroleum displacement is due to efforts mandated fleets, including covered Federal, State, and AFP. Due to data collection protocols and the format of the data collection, however, the Clean Cities' numbers include some attributable to the regulated fleets and, thus, it is not possible to differentiate which portion arises solely from the fleet programs and which portion stems from the Clean Cities program alone.

Many of these gains were made while Clean Cities activities were focused solely on alternative fuels. Over the past several years, Clean Cities efforts now include HEVs, idle reduction technologies, fuel efficiency measures, and replacement fuel blends. It is notable that many of the AFV successes linked to these voluntary local Clean Cities efforts have been with heavy-duty trucks, buses, and other specialized niche markets (not regulated by EPACT 1992 programs), where large concentrations of vehicles combined with extremely high fuel use per vehicle can make the infrastructure investment cost effective and sustainable. In many of these situations, local, regional, or state incentives and mandates have also driven the market (including South Coast Air Quality Management District's fleet mandates, California's Carl Moyer funding, California Energy Commission funding opportunities, New York State Energy Research and Development Authority use of petroleum overcharge funds).

Energy Independence and Security Act (EISA) of 2007

In response to the President's 2007 legislative proposal to reduce gasoline consumption by 20 percent in 10 years ("20 in 10"), EISA was developed and signed into law on December 19, 2007 (Pub. L. No. 110-140). EISA calls for an increase in the Renewable Fuel Standard established under EPACT 2005 to 36 billion gallons per year by 2022 [42 U.SC. 7545(o)(2)(B)], and an increase in CAFE to 35 miles per gallon (mpg) by 2020 [49 U.SC. 32902(b)(2)(A)].

Additionally, EISA revises provisions relevant to the EPACT 1992 fleet programs. The most significant elements of EISA in the context of the EPACT 1992 fleet programs follow the framework of "Twenty in Ten," by calling for greater use of non-petroleum fuels and increases in LDV fuel economy. Specifically, EISA calls for:

- Extending CAFE credits for FFVs [i.e., vehicles capable of operating on either gasoline or near-neat (85 percent) alcohol blends with gasoline, or any mixture in between] manufacturing through 2019 (fully through 2014, and ramping down in amount of credit through 2019) (49 U.S.C. 32902);
- Requiring Federal fleets to reduce petroleum consumption (42 U.S.C. 6374e), increase alternative fuel use (42 U.S.C. 6374e), acquire low-greenhouse-gas emitting vehicles (42 U.S.C. 13212) and install renewable fuel infrastructure (42 U.S.C. 17053); and
- The inclusion of certain vehicle types and activities (e.g., hybrids, neighborhood electric vehicles, alternative fuel refueling infrastructure, and investments in technology development) to the list of vehicles and activities that can qualify for acquisition credit for certain EPACT fleets (42 U.S.C. 13258).

Each of these elements, in particular the significant expansion of the Renewable Fuel Standard and the revised CAFE requirements, will increase the achievability of the revised Replacement Fuel Goal.

EPACT 1992 Impact on AFV Technology Development

AFV availability and costs have changed since the enactment of EPACT 1992. During this period, OEMs expanded the number of AFVs offered and the number of available alternative refueling stations has grown. This section of this report examines the changes in AFV technologies, the AFV market, and alternative fuel infrastructure since the enactment of EPACT 1992. Because other factors—such as the price of oil and the availability of CAFE credits for AFVs—impact AFVs and infrastructure development, the precise extent to which EPACT 1992 has affected the AFV and alternative fuel markets is not certain. Also uncertain is the impact EPACT 2005 will have on AFV technology development. As many EPACT 2005 provisions only now are beginning to be implemented, it will take time to achieve and assess the complete gains and successes of the EPACT 2005 programs.

Alternative Fueled Vehicles (AFVs)

When EPACT 1992 was enacted in October 1992, OEMs offered only a few AFV models, and most available AFVs were compressed natural gas (CNG) or liquefied petroleum gas (LPG) aftermarket conversions. In MY 1993, OEM offerings included:

- Four FFV models, which can run on gasoline or a mixture of 85 percent ethanol and 15 percent gasoline;
- Three FFV models that run on methanol, gasoline, or a mixture of both and one that ran on ethanol, gasoline;
- One CNG full-size van/wagon model;
- Two CNG pickup truck models;
- An electric minivan model; and
- A propane-powered medium-/heavy-duty truck chassis model.

Many of these offerings were not full production vehicles, but were produced in small volumes for a limited market.

Although FFV availability has increased substantially since 1993, the availability of other types of AFVs has actually decreased. MY 2008 offerings include:

- More than 30 light-duty E85 (85 percent ethanol, 15 percent petroleum) FFV models (including mid- and full-size pickups, minivans, full-size vans, sport utility vehicles, and mid-size and full-size passenger cars), which can run on gasoline or a mixture of 85 percent ethanol and 15 percent gasoline, and any mixture of each;
- A compact CNG sedan model;
- A small hydrogen fuel cell sedan model (in very limited numbers); and

- A full-size propane pickup model modified by an aftermarket manufacturer (but considered for warranty purposes as an OEM vehicle).

During the 1990s and early 2000s, a number of additional vehicle/fuel types were offered. At one point, light-duty CNG vehicle models were available as compact, mid-size, and full-size sedans, pickups, minivans, and full-size vans. However, by 2006 only one light-duty CNG vehicle model was available for purchase. Propane and electric vehicles are no longer offered by OEMs, and there has not been a methanol-fueled vehicle offered since the mid-1990s. Some light-duty AFVs, particularly CNG and electric vehicles, did not achieve sufficient market penetration due to unfavorable economics (relatively low petroleum fuel prices combined with significant vehicle purchase incremental costs and high capital costs for new infrastructure), an insufficient number of refueling locations, or performance limitations (e.g., vehicle range on a single fill or charge). As a result, these models nearly disappeared from the market. Customers interested in light-duty gaseous (CNG and LPG) fuel vehicles have largely had to return to the conversion market for products. While 2008 conversions are significantly more sophisticated than those from the early 1990s, costs may be prohibitive for fleets, and availability is still relatively limited.

Although EPACT 1992-covered fleets (Federal, state, and AFP) acquired nearly 200,000 AFVs, this represents less than 1 percent of the number of LDVs on U.S. roads and annual vehicle purchases. Because the demand for AFVs (or vehicles of any kind) by these EPACT 1992 fleets is minor relative to general consumer demand, manufacturers have not responded wholly to EPACT fleet demand with additional AFV models. OEMs, however, have produced more than six million FFVs in several different models, most likely for the CAFE credits. However, some of these FFV models are not necessarily the types of vehicles covered fleets would use in their normal business practices.

Alternative Fuel Infrastructure

Since 1992, the number and type of alternative fuel stations have grown and changed. In 1992, there were approximately 3,600 alternative fuel stations[21]—90 percent offering propane. Currently, there are approximately 5,700 stations[22] offering seven different types of alternative fuels. As of September 2008 there are approximately 162,000 gasoline refueling stations nationwide.[23] Many of the propane stations included in these numbers may in fact be limited to refilling canisters for home use and may not be capable of refueling vehicles, but current data collection methods do not make this distinction. Likewise, many of the electric vehicle stations

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[21] Transportation Energy Data Book, Edition 13, Oak Ridge National Laboratory, 1993, Document No. ORNL-6743.

[22] Alternative Fuels and Advanced Vehicles Data Center, Alternative Fuel Station Locator, National Renewable Energy Laboratory, 2007, www.eere.energy.gov/afdc/infrastructure/refueling.html.

[23] U.S. Energy Information Administration, Frequently Asked Questions, Gasoline, available at http://tonto.eia.doe.gov/ask/gasoline_faqs.asp (Dec. 9, 2008) (referencing National Petroleum News MarketFacts Highlights 2008, available at http://www.npnweb.com/ME2/dirmod.asp?sid=A79131211D8846B1A33169AF72F78511&type=gen&mod=Core+Pages&gid=CD6098BB12AF47B7AF6FFC9DF4DAE988 (Dec. 9, 2008)).

are simply an electrical outlet suitable and available for recharging these vehicles and may not include any additional infrastructure.

Alternative fuel refueling stations tend to be concentrated in certain areas of the United States. For example, ethanol and biodiesel stations are concentrated in the Midwest, while CNG stations are located mostly on the East and West coasts. Propane stations, although numerous, are primarily located in rural areas (generally outside the MSA/CMSAs specified in the EPACT 1992 definition of "fleet"). The locations of these stations do not necessarily coincide with the needs of the Federal, state, and AFP fleets.

While CNG stations and electric recharging sites grew in the 1990s, this growth has stalled and, in some cases, declined. Many stations have closed due to insufficient demand or a decline in interest in this market by fuel providers. Deregulation of the natural gas industry was followed by utility companies dropping programs not perceived as relevant to the "heart" of their business (or failing to generate sales sufficient to justify investments), which in many cases included alternative fuel stations. Methanol stations were once available in California, (to supply the state's own fleet program), but have since closed. At this time, interest in biofuels—biodiesel blends and E85—is increasing and, therefore, has generated the most growth in refueling stations.

EPACT 1992 and Technology Development

Through 2007, EPACT 1992 appears to have had limited impact on the availability of both AFVs and alternative fuel infrastructure. Some technologies, which earlier were seen as likely "winners," have fallen by the wayside over the past few years. However, other technologies such as E85 and biodiesel in particular, eventually became more widely available. Important factors influencing the development of alternative fuel infrastructure include oil prices, regional conditions, and mandates. Low oil prices between 1992 and approximately 2003 made it difficult for a non-regulated fleet to make a sufficient business case for adopting alternative fuels, and as a result likely limited the impact of the EPACT 1992 programs on the broader vehicle market. Regional conditions and mandates have resulted in a concentration of E85 stations in the Midwest (in particular Minnesota), although these regions do not include a significant number of Federal, state, or AFP fleets.

While the availability and use of alternative fuels has increased since the inception of the CAFE credit incentive provision, it has not nearly kept pace with the increase in the number of AFVs. Although there are 162,000 gasoline stations nationwide,[24] there are only approximately 5,700 alternative fuel refueling sites and just 1,700 of these stations offer E85 as of December 2008.[25]

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[24] U.S. Energy Information Administration, Frequently Asked Questions, Gasoline, available at http://tonto.eia.doe.gov/ask/gasoline_faqs.asp (Dec. 9, 2008) (referencing National Petroleum News MarketFacts Highlights 2008, available at http://www.npnweb.com/ME2/dirmod.asp?sid=A79131211D8846B1A33169AF72F78511&type=gen&mod=Core+Pages&gid=CD6098BB12AF47B7AF6FFC9DF4DAE988 (Dec. 9, 2008)).

[25] U.S. DOE, Energy Efficiency and Renewable Energy, Alternative Fuels & Advanced Vehicles Data Center, "Alternative Fueling Station Total Counts by State and Fuel Type", available at http://www.afdc.energy.gov/afdc/fuels/stations_counts.html (Dec. 9, 2008).

The Federal government, specifically DOE, the General Services Administration (GSA), and the U.S. Department of Agriculture, are involved with efforts to promote the use and expansion of alternative fuels and the alternative fuel infrastructure. A major focus of these efforts is the development of different feedstocks for ethanol and partnerships that result in the expansion of the ethanol fueling infrastructure.[26]

EPACT 1992 Impact on Costs of AFVs

Although regulated and voluntary fleets have acquired thousands of AFVs, DOE believes that the size of demand for AFVs has not been large enough to affect the cost of AFVs to any significant degree. Nonetheless, DOE also believes that more models of AFVs likely are available than would otherwise have been available had the EPACT 1992 programs not been established to serve as launching pads and opportunities to learn how to implement alternative fuel technologies into the market place. In addition, historically, AFVs and AFV conversion kits have cost more to purchase than conventional gasoline vehicles, from a few hundred to several thousand dollars. However, now the cost differential is negligible to non-existent for certain ethanol technologies. For example, ethanol-fueled vehicles were previously priced about three hundred dollars more than the gasoline versions, but now are priced the same. Price drops are also apparent for conversion kits. Though for electric vehicles the cost differential is still several thousand dollars, the differential is much lower than previously. In the context of FFVs, the price of a FFV is generally equivalent to the price of the non-FFV version, while the cost of a gaseous-fuel AFV is still significantly higher than that of the conventional version.

Automobile manufacturers are able to improve CAFE standards for the purpose of complying with the CAFE requirements through the sale of AFVs. This incentive is likely the most influential factor for manufacturers to produce larger numbers of FFVs. According to the National Highway Traffic Safety Administration[27] (NHTSA), auto manufacturers stated that the CAFE incentive program has been a major factor in developing and manufacturing FFVs and AFVs in high volumes, and that the extension of the credit provision will be a major factor in continuing to offer FFVs in the volumes being produced in 2008. FFVs are only slightly more expensive to produce than conventional gasoline vehicles (now on the order of $50 to $200 per vehicle), can operate on gasoline, and provide a compliance advantage when calculating a manufacturer's compliance with the CAFE standard.

Overall, while DOE believes that any discernible decline in price for AFV models has been helped by both the large number of AFV purchases regulated fleets have made and the impact of CAFE credits, the specific impact of the EPACT 1992 Titles III, IV, and V programs on AFV pricing is unknown.

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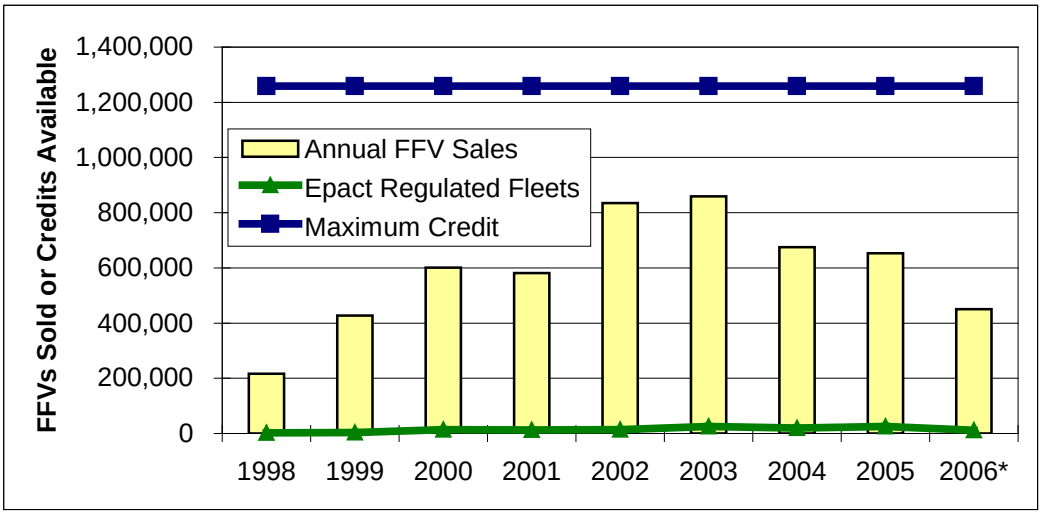
[26] NHTSA Report to Congress, "Effects of the Alternative Motor Fuels Act CAFE Incentives Policy." (March 2002) (www.nhtsa.dot.gov/cars/rules/rulings/CAFE/alternativefuels).

[27] NHTSA Report to Congress, "Effects of the Alternative Motor Fuels Act CAFE Incentives Policy." (March 2002) (www.nhtsa.dot.gov/cars/rules/rulings/CAFE/alternativefuels).

Figure 1 shows the total E85 FFVs EPACT 1992-covered fleets purchased each year compared to the number sold in the market as a whole. The top line represents NHTSA's estimate of the maximum number of FFVs that could be sold without exceeding the statutory limits under the CAFE incentive provisions. According to the Alternative Motor Fuels Act of 1988 (P.L. 100-494, Section 6(a), and as amended by EPACT 2005), the maximum increase in CAFE a manufacturer can receive from the sale of FFVs and other dual-fuel vehicles is 1.2 mpg, which ultimately factors into determining the maximum number that an individual manufacturer can sell to improve its CAFE rating (see 49 U.S.C. 32906).

Figure 1. FFV Sales and Manufacturers' CAFE Credit Cap



*EPACT 1992 regulated fleets includes 2006 data for only state and alternative fuel provider fleets; FY 2005 is the latest year for which Federal fleet data is publically available.

As shown in Figure 1, the number of FFVs EPACT 1992-covered fleets acquired in any given year has never exceeded approximately four percent of total FFV sales. Under EISA Section 109, this manufacturing credit for dual-fuel vehicles is scheduled to begin to phase out after 2014, with phase out completed by the end of 2019.

A more telling comparison is the manufacturers' cap under CAFE and the number of FFV sales. As shown in Figure 1, in some years the CAFE cap is approached, and in all years the FFV sales are typically far closer to the cap than to the sales in EPACT-covered fleets. Thus, while this correlation does not prove causality, it is likely that the CAFE program is the major factor driving FFV sales. The tracking between FFV sales and the cap is perhaps best exemplified by the trend line for MY 2001 through MY 2003, where manufacturers appeared to be moving toward the expected 2005 cap of 0.9 mpg (down from 1.2 mpg). Originally, the CAFE credit cap for FFVs was scheduled to drop from 1.2 mpg to 0.9 mpg in 2005, but Section 772 of EPACT 2005 (49 USC 32905) restored the 1.2 mpg cap. Figure 1 also illustrates that manufacturers may have been slowing production, and thus sales of FFVs, after 2003 to approach (but not exceed) the original 0.9 mpg cap. By the end of 2006, manufacturers had not yet begun to increase efforts to accelerate toward the restored level of 1.2 mpg. It is important to note that industry-wide, automakers have not exceeded the cap shown in Figure 1. There have been several

instances, however, where individual manufacturers have sold more FFVs than they were able to apply for the purpose of CAFE compliance. More recently, several of the major auto manufacturers have announced plans to increase significantly production of FFVs, potentially resulting in the annual manufacture of several times the number of FFVs currently available in the United States. At this time, however, it is unclear if and when these levels of production will be achieved.

It is likely because of the CAFE credit incentive provision that ethanol FFVs are generally sold without incremental purchase costs. Incremental costs for light-duty CNG vehicles, however, are about $4,000 to $6,000.[28] The incremental cost is due largely to the additional cost of CNG storage tanks, relatively low production volume, and a premium (in some cases) for being "custom-built" vehicles. Propane vehicles, when available from OEMs, generally carried a slightly lower incremental cost than CNG vehicles (closer to $2,000),[29] due to fewer storage requirements and less costly, lower pressure fuel storage cylinders.

EPACT 1992 Compliance Activity

Each year, covered fleets must report their compliance activity to DOE. Federal fleets submit their reporting data through FAST, an online database (https://fastweb.inel.gov) managed by DOE's Idaho National Laboratory (INL). State and AFP fleets also report their annual AFV acquisition data electronically through the state and AFP fleet database (www.eere.energy.gov/vehiclesandfuels/epact/state/poc_login.html) managed by DOE's National Renewable Energy Laboratory.

Since FY 2003, Federal fleets as a whole have met or exceeded the required 75 percent AFV acquisition requirement. State and AFP fleets overall have also met or exceeded the requirements each year from 2000 through 2006. In the few cases where individual state or AFP fleets have fallen short, DOE has reached agreements with the fleets either to acquire credits or to over-comply in future years.

AFVs Acquired by Regulated and Voluntary Fleets

Since the enactment of EPACT 1992, covered Federal, state, and AFP fleets have purchased nearly 200,000 light-duty AFVs, and voluntary fleets in the Clean Cities initiative have acquired more than 290,000 light-duty AFVs. Due to data collection protocols, however, AFVs in voluntary fleets include some vehicles regulated fleets acquired. The exact extent is not known because Clean Cities data collection does not differentiate between voluntary and regulated fleets.

Table 1 summarizes the current light-duty AFV inventory of regulated and voluntary fleets. These programs purchase a very limited number of AFVs annually. Combined, the Federal fleet

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[28] Congressional Research Service, *Alternative Transportation Fuels and Vehicles: Energy, Environment, and Development Issues*, page 10 (January 2005).

[29] Congressional Research Service, *Alternative Transportation Fuels and Vehicles: Energy, Environment, and Development Issues*, page 8 (January 2005).

and the state and AFP fleets only purchase 20,000 to 30,000 AFVs annually. The Clean Cities coalitions purchase as many as 60,000 to 70,000 AFVs annually. Therefore, together these programs purchase approximately 100,000 AFVs each year, whereas OEMs sell more than 16 million vehicles each year.

Table 1. Light-Duty AFVs Operated or Acquired by Regulated and Voluntary Fleets

Vehicle	Federal Fleets*	State Fleets**	AFP Fleets**	Total Regulated Fleets	Total Voluntary Fleets***
CNG	10,167	11,400	16,452	38,019	46,603
E85	82,572	57,303	3,880	143,755	221,765
Electric	121	486	3,017	3,624	3,738
Hydrogen	0	2	9	11	68
Liquified Natural Gas (LNG)	37	4	3	44	55
LPG	217	8,088	3,327	11,632	18,353
M85 (85 percent methanol, 15 percent gasoline)	2	1,361	109	1,472	479
Total	**93,116**	**78,644**	**26,797**	**198,557**	**291,061**

*Through FY2005. Inventory data is reported by Federal fleets. FY2005 is the last year for which all data is publically available.

** Through MY2006. There is no requirement to collect inventory data from state and AFP fleets; therefore, these numbers are total acquisitions since initiation of requirements in MY 1997. MY2006 is the last year for which all data has been submitted.

*****Through 2006. Includes LDVs reported as being operated in Clean Cities stakeholder fleets, including some light-duty AFVs in regulated fleets. Tracking methods in the programs do not allow for allocating acquisitions between the voluntary and regulated programs.

Alternative Fuel Used and Petroleum Displaced by Regulated and Voluntary Fleets

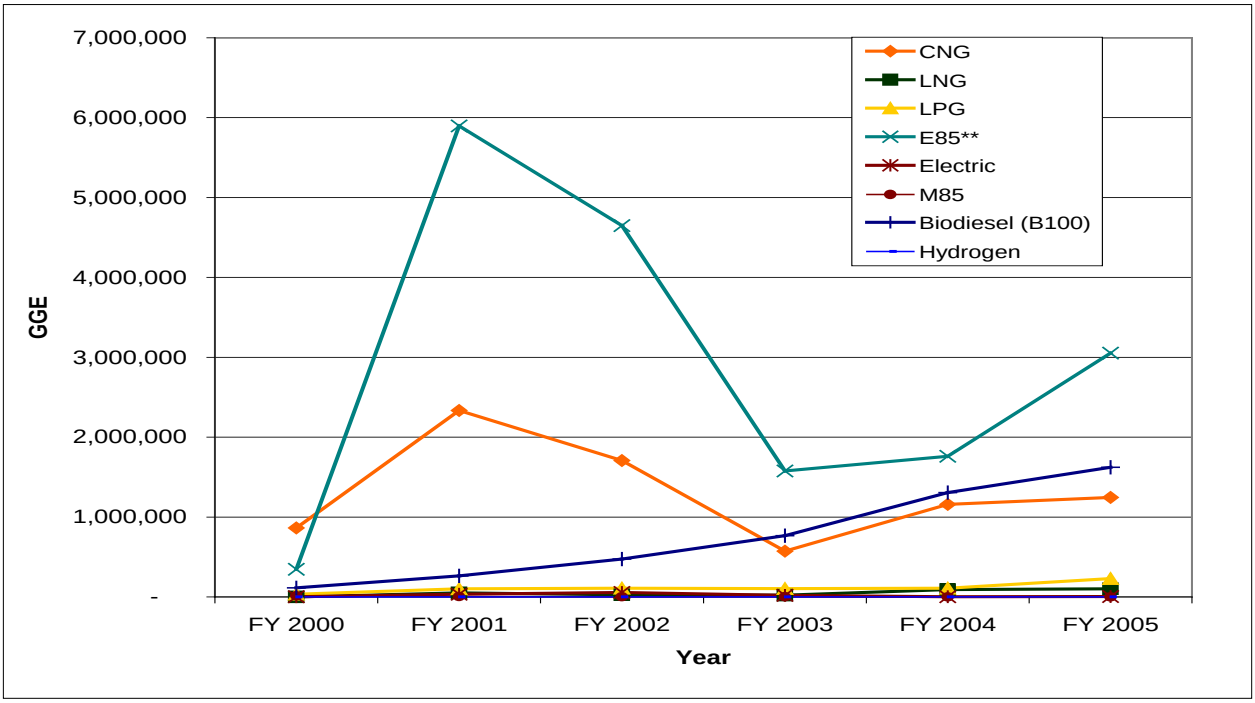
As noted earlier, E.O. 13149, and subsequently E.O. 13423 and EISA, which direct Federal fleets to use alternative fuels in their AFVs and report their annual fuel use, reinforced the emphasis on alternative fuels as a strategy for moving away from petroleum. In total, covered Federal fleets used approximately 31 million GGE of alternative fuel from FY 2000 to FY 2005.[30] Figure 2 illustrates the types and amounts of alternative fuel used by covered Federal fleets since FY 2000. In FY 2005, Federal fleets used 6.2 million GGE of alternative fuels, representing more than two percent of all of the fuel these fleets used.[31] It should be noted that due to problems in data reporting, Federal agencies over-reported alternative fuel use in FY 2001 and therefore Figure 2 overstates alternative fuel use for that fiscal year.

30 Federal Automotive Statistical Tool, *Query Results: Section I Inventory and Acquisition Data (All Agencies, FY2005, LD, AFVs)*, December 2008.

31 U.S. DOE, Federal Energy Management Program, *Federal Fleet Compliance with EPAct and E.O. 13149: Fiscal Year 2005*, Appendix B, http://www1.eere.energy.gov/vehiclesandfuels/epact/pdfs/2005_fed_fleet_report.pdf.

In 1999, biodiesel use became a compliance option for covered fleets. Every 450 gallons of 100 percent biodiesel (B100) is equivalent to a single EPACT credit, and thus replaces the acquisition of one AFV (42 U.S.C. 13220). Although state and AFP fleets are not required to report alternative fuel use, they must report biodiesel fuel use to receive credits. Since 1999, state and AFP fleets have reported more than 17 million GGE of biodiesel use (recorded as B100, although typically used as B20).[32] This is the energy equivalent of 15 million gallons or 364,000 barrels of petroleum. This is added to the more than 8 million GGE of biodiesel used by Federal fleets.

Figure 2. Federal Fleet Reported Alternative Fuel Consumption since FY 2000*

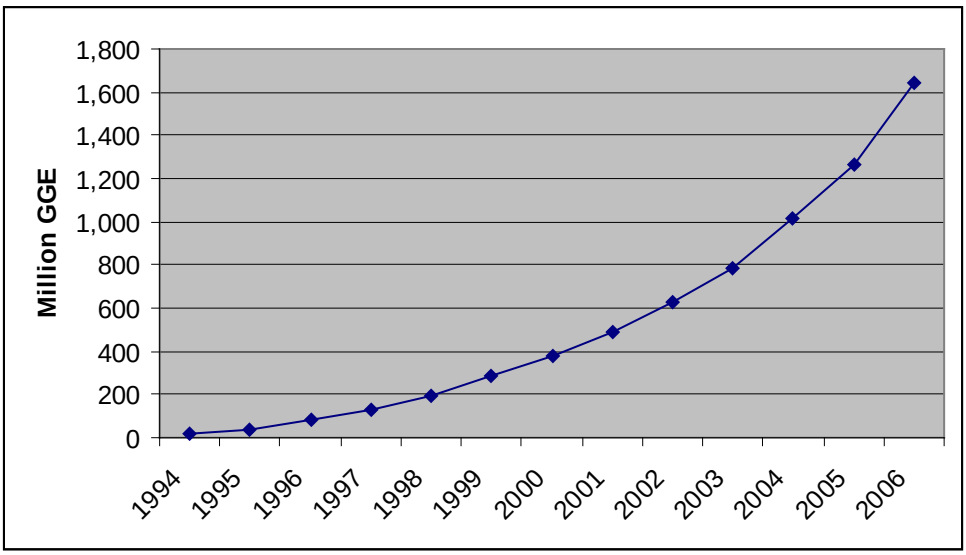


*FAST (https://fastweb.inel.gov). FY 2005 is the latest year in which the data is publically available for the Federal fleet.
**E85 fuel use overestimated by fleets in FY 2001 and FY 2002; data quality has improved each year since.

Clean Cities estimates that its efforts have resulted in the use of more than 1.6 billion GGE of alternative fuels since the program's inception (see Figure 3), which is less than 1 percent of highway motor fuel usage during 2006 alone. Due to format of the data collection, however, it is not possible to distinguish between the vehicles and fuels used by regulated and voluntary fleets. As a result, Clean Cities' numbers include some attributable to the regulated fleets. Of course, these two programs are mutually reinforcing because voluntary efforts help regulated fleets succeed and the regulated fleets serve as a springboard for voluntary efforts. Overall, the EPACT programs displace hundreds of millions of gallons of petroleum annually. This amount, however, is less than one percent of the approximately 175 billion gallons of petroleum used on the nation's highways each year.

[32] U.S. DOE, Energy Efficiency and Renewable Energy, Vehicle Technologies Program, EPAct Resources, Annual Reports, available at http://www1.eere.energy.gov/vehiclesandfuels/epact/state/state_resources.html#annual (Dec. 9, 2008).

Figure 3. Cumulative Petroleum Displacement by Voluntary Fleets (Clean Cities)*



*Estimated fuel use based on Clean Cities annual questionnaire results. As noted above, these numbers potentially include petroleum displacement by regulated as well as Clean Cities fleets.

Costs of Fleet Compliance with EPACT 1992

Implementation of the EPACT fleet programs resulted in direct costs to fleets and indirect costs to the government in the form of tax incentives, grants, or other subsidies. DOE, through the Clean Cities program activities, awarded grants totaling more than $70 million since the grants program began in 1999.[33] These grants are for projects intended to expand the use of alternative fuels and reduce vehicular petroleum use (www.eere.energy.gov/cleancities). The U.S. Environmental Protection Agency (EPA) implements the Clean School Bus Program (www.epa.gov/cleanschoolbus/) and a number of regional programs: the Midwest Clean Diesel Initiative (www.epa.gov/midwestcleandiesel/index.html), Blue Skyways Collaborative, Rocky Mountain Clean Diesel Collaborative, and the West Coast Diesel Collaborative. EPA also implements a Smart Growth program (www.epa.gov/smartgrowth/topics/transportation_funding.htm). The Federal Highway Administration's Congestion Mitigation Air Quality program funds transportation projects or programs, including AFVs and fuels, that are expected to contribute to attainment or maintenance of the national ambient air quality standards, including alternative fuel vehicles and fuels (www.fhwa.dot.gov/environment/cmaqpgs/06guide.htm).

EPACT 2005 included a number of provisions (Sections 1341, 1342, and 1344) providing tax incentives for vehicles, alternative fuel infrastructure, and alternative fuels. Also, Section 11113 of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU, Pub. L. No. 109-59) includes a tax credit for a number of alternative fuels

[33] *See* U.S. DOE, Energy Efficiency and Renewable Energy, Clean Cities, Accomplishments, Project Funding and Lending, available at http://www1.eere.energy.gov/cleancities/accomplishments.html (Dec. 9, 2008).

(www.fhwa.dot.gov/safetealu/legis.htm). These incentives are available to consumers, voluntary fleets, and, directly or indirectly, to regulated fleets. The costs of these programs' support to EPACT regulated and voluntary fleets are difficult to estimate because the tax incentives are available beyond just EPACT fleets, and many have only recently been implemented. Because direct costs are more quantifiable, only these are included in this report. This section of this report includes the costs of EPACT 1992 compliance, specifically the costs covered fleets incur purchasing AFVs and biodiesel and in compiling and filing annual reporting data.

AFV Acquisitions

Estimated ranges for direct incremental costs for the regulated fleets' AFVs are summarized in Table 2, and the total projected direct costs are shown in Table 3. These costs are based on the number of light-duty AFVs acquired in the programs and the incremental costs to fleets based on AFV type. Incremental cost is the additional cost of an AFV beyond the cost of a comparable vehicle in a conventional engine configuration. These costs are an attempt to estimate the additional costs to these fleets due to the EPACT AFV acquisition requirements.

Table 2. Direct Average Incremental Light-Duty AFV Costs

Vehicle	Incremental Vehicle Cost Range**
CNG	$4,000-$6,000
E85*	$0
Electric	$10,000-$20,000
LNG	$4,000
LPG	$1,000-$2,000
M85	$500-$2,000

*Cost to consumers. Manufacturers have ~$100 to $200 in incremental costs.
****** Congressional Research Service, Alternative Transportation Fuels and Vehicles: Energy, Environment, and Development Issues, (January 2005)

Table 3. Estimated Total Light-Duty AFV Incremental Costs in Regulated Fleets*

Federal Fleets		State Fleets		AFP Fleets	
Number of AFVs	Cost ($ million)	Number of AFVs	Cost ($ million)	Number of AFVs	Cost ($ million)
93,116	$53.1	78,644	$78.1	26,797	$132.7

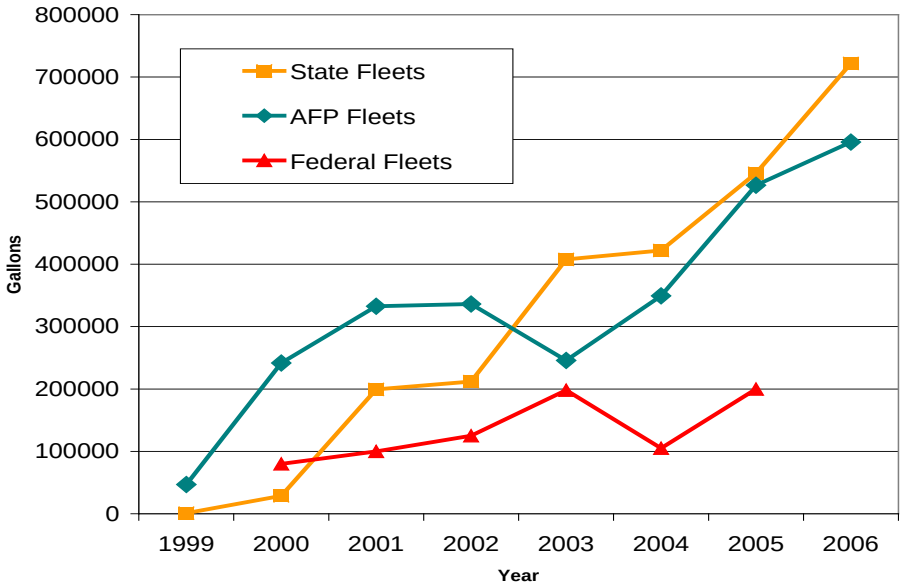
*Costs were not provided for hydrogen vehicles because they were not commercially available.

Fuel and Infrastructure Costs

Regulated fleets can comply with AFV acquisition requirements by purchasing biodiesel. Covered fleets can only receive biodiesel credit for up to 50 percent of their AFV acquisition requirement. However, generally these fleets consistently buy more biodiesel than credit received [10 C.F.R. Part 490, Section 490.705(c)]. Federal fleet biodiesel use continues to increase but has not yet reached the 50 percent cap. Figure 4 shows the number of gallons of biodiesel (reflected as B100, although in application it must be used in blends of at least 20 percent biodiesel and 80 percent diesel) regulated fleets used and received credit for from the

period from 1999 through 2005.[34] In prior years, biodiesel cost considerably more per gallon than conventional diesel. Recently, incentives have brought the cost of biodiesel to near parity with diesel fuel, particularly when blended as B20. Since 1992, regulated fleets have built more than 620 alternative fuel refueling stations of all alternative fuel types[35] throughout the U.S. EPACT 1992 does not require regulated fleets to install infrastructure, thus this report does not include these costs.

Figure 4. B100 Gallons for EPAct Compliance*



* Federal data from FAST (through FY2005, the last year for which data is publically available; State and AFP data from State and Alternative Fuel Provider Fleet Database (through MY 2006).

Administrative and Recordkeeping Expenses

Recordkeeping is necessary for DOE to determine whether regulated fleets are in compliance with EPACT 1992's vehicle acquisition requirements. It is also necessary to ensure that DOE meets various reporting requirements contained in EPACT 1992 (42 U.S.C. 13218; see also 10 C.F.R. Sections 490.205 and 490.309). To track information on regulated fleets, the government created FAST and the state and AFP fleet databases to collect information on fleet compliance. These databases are accessible via the internet, enabling fleets to submit their reports electronically.

Information collected from state government and AFP fleets includes number of covered vehicles acquired, amount and types of AFVs acquired, and gallons of biodiesel used. As the Federal government is required to collect information on EPACT 1992 and E.O. 13149 compliance, data collected from Federal fleets is more comprehensive. It includes number and

[34] For this analysis, only the costs incurred for compliance (i.e., biodiesel credits) are included.

[35] Based upon a review of fueling stations and ownership information available at the Alternative Fuels and Advanced Vehicles Data Center Alternative Fuel Station Locator (as of January 3, 2008), www.eere.energy.gov/afdc/infrastructure/refueling.html.

types of vehicles in operation and acquired (both conventional and AFVs) and amount of conventional and alternative fuel used.

In 2006, DOE estimated the cost of compliance with its reporting provisions for state government and AFP fleets as required by the Office of Management and Budget. DOE estimated each fleet requires an average of five hours to collect and report the information required for state government and AFP fleets. For MY 2006 (reported during FY 2007), DOE received 315 reports from covered state and AFP entities.[36] Thus, the total estimated time for reporting, collecting, submitting, and maintaining records was 1,575 hours for a combined cost of approximately $72,650 for the model year.

For Federal agency reporting, DOE estimates that collecting data, submitting annual reports, maintaining the database, and verifying reports takes each agency an average of about 400 hours.[37] This is due to the nature of Federal agency fleets, which are spread out across the country and may include as many as 100 separate entities responsible for submitting data. Therefore, as each of these entities takes four hours to complete the task, the agency as a whole will need 400 hours. Based on these assumptions, DOE estimates that together Federal agencies incur a total of about $480,000 per year to submit compliance data.

In addition to the costs the Federal, state, and AFP entities incur, the Federal government incurs costs for maintaining program databases, compliance oversight and correspondence, education and outreach, analysis activities, and related work. The amount Congress appropriated for managing these activities in support of the regulated fleet programs is typically about $1.5 million per year.

Training and Employee Expenses

Although most EPACT-covered fleets train drivers and other employees to use and maintain AFVs, when the program was established, there was no requirement to report this data. Therefore, DOE has no comprehensive assessment of the costs incurred in this area.

Regulated State and AFP fleets have complied with EPACT 1992 acquisition requirements. Although some individual Federal agencies have failed to comply with EPACT 1992, the Federal fleet as a whole has exceeded its EPACT 1992 requirements for the past several years, as shown in Figure 5. State and AFP fleets have similarly exceeded their AFV-acquisition requirements, as evidenced in Figure 6.

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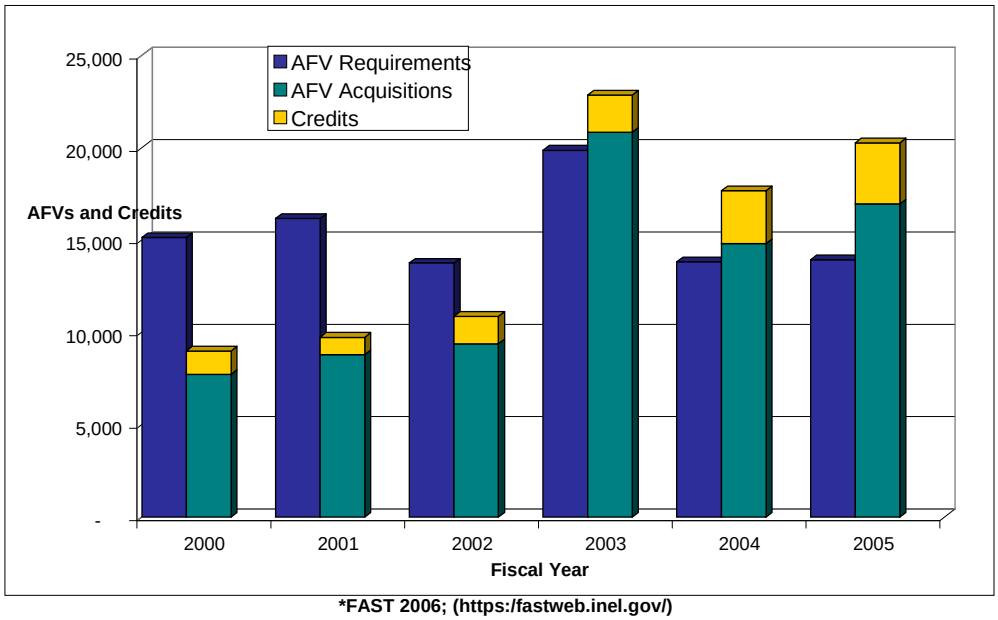
[36] U.S. DOE, Energy Efficiency and Renewable Energy, Vehicle Technologies Program, EPAct Resources, Annual Reports, "Activities and Accomplishments in MY 2006" available at http://www1.eere.energy.gov/vehiclesandfuels/epact/state/state_resources.html#annual (Dec. 9, 2008).

[37] Communication between INL Personnel inputting data into FAST and the National Renewable Energy Laboratory (2007). INL operates FAST, an online database (https://fastweb.inel.gov) to which Federal fleets submit their reporting data.

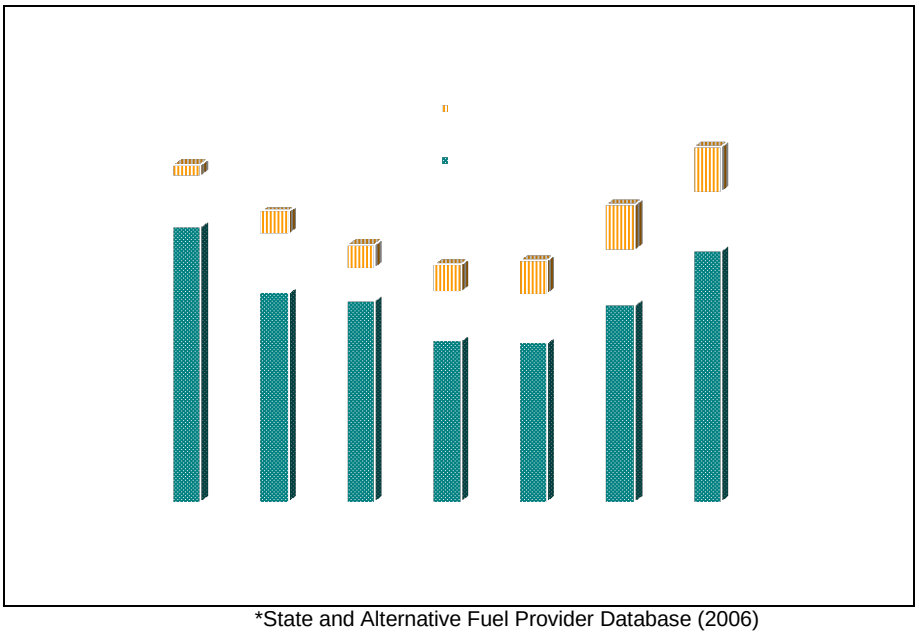
Figure 5. Federal Fleet Compliance



***FAST 2006; (https:/fastweb.inel.gov/)**

FY 2005 is the latest year for which is publically available.

Figure 6. State and AFP Fleet EPACT Compliance



*State and Alternative Fuel Provider Database (2006)

Obstacles to Fleet Compliance with EPACT 1992

Meeting the broader EPACT 1992 goal of displacing petroleum has been more problematic. Increased alternative fuel use has been hindered by spotty alternative fueling infrastructure in many areas, narrow AFV model selection, increased costs, and low oil prices through 2004. This section of this report focuses primarily on these issues.

Refueling Infrastructure

With increased numbers of AFVs available, it appears that limited availability of alternative fueling infrastructure is the most important obstacle to increasing alternative fuel use. EPACT 1992 does not require regulated entities or fuel retailers to install refueling capacity for alternative fuels. Also, because regulated fleets represent only a small fraction (less than one percent) of the AFVs on U.S. roads, these fleets are insufficient for driving the overall demand for alternative fuel, other than at a few locations with high concentrations of regulated fleet vehicles. Fuel retailers have been reticent to invest in alternative fuel pumps because the number of AFVs in operation is still relatively low compared to conventional vehicles, and the AFVs that are in use in the U.S. are dispersed throughout the nation.

The lack of infrastructure creates two problems: discouraging the acquisition of AFVs and reducing the amount of alternative fuel that can be used in AFVs that actually are acquired. For state and AFP fleets, the lack of available alternative fueling infrastructure has necessitated granting fleet exemptions under Section 507(i) of EPACT 1992 [42 U.S.C. 13257(i)] thus lowering the overall number of AFVs acquired. Overall exemptions for state and AFP fleets, however, have remained relatively low (less than 10 percent of requirements) and even decreased since using biodiesel became a compliance option. The lack of alternative fuel infrastructure also makes it more difficult to encourage non-regulated fleets and consumers to acquire AFVs.

A related problem is the difficulty in tracking fleet alternative fuel use. Federal fleets are required to report fuel use annually, yet have struggled to obtain and retain accurate data because there are no product codes for alternative fuels. Industry has been reluctant to implement a new product code for alternative fuels. This continues to be a problem for fleets that refuel off-site, as off-site fuel receipts typically do not distinguish between alternative fuels and non-alternative fuels. A continued lack of product identification will likely hinder efforts to accurately report alternative fuel use in these fleets, and thus these fleets may have difficulty in demonstrating compliance. While a lack of available data likely results in an under reporting of alternative fuel use, the lack accurate fuel use data may make it difficult to determine where additional alternative fuel infrastructure is required, thus potentially inhibiting efforts to increase alternative fuel use.

Congress included infrastructure tax incentives in EPACT 1992 and 2005. Section 1913 of EPACT 1992 (26 USC 30) provided a tax deduction for alternative fuel infrastructure. Section 1342 of EPACT 2005 (26 USC 30C) changed the deduction to a tax credit for infrastructure. The credit is equal to 30 percent of the cost of any qualified refueling property the taxpayer places in service during the taxable year. It is not known how many covered fleets will take advantage of this incentive.

Table 4 shows infrastructure cost ranges for facilities fueling light-duty AFVs only. Infrastructure for heavy-duty AFVs would be significantly higher. Actual refueling station costs depend on size, permitting requirements, and design (e.g., above-ground versus below-ground tanks). The ranges provided in Table 4 are for cost comparisons only.

Under EISA, Congress directed DOE to study the feasibility of requiring motor fuel retailers to install E85 pumps in markets where FFVs account for 15 percent of motor vehicles (42 U.S.C. 17051). It is anticipated that this feasibility study will be started late in 2008.

Table 4. Typical Cost Ranges for Alternative Fuel Infrastructure for Light-Duty AFVs*

Fuel Type	Total Capital Cost
Biodiesel	$5,000-$10,000
CNG	$125,000-$250,000
E85	$10,000-$100,000
Electric	$1,000-$25,000
Hydrogen	$250,000-$5,100,000
LNG	$250,000-$750,000
LPG	$35,000-$50,000
M85	$10,000-$25,000

Weinert, J., T. Lipman, Institute of Transportation Studies, University of California, Davis. "An Assessment of the Near-Term Costs of Hydrogen Refueling Stations and Station Components" (2006).
U.S. Department of Transportation, U.S. Department of Energy, U.S. Environmental Protection Agency. "Report to Congress: Effects of the Alternative Motor Fuels Act CAFE Incentives Policy" (2002).
American Methanol Institute. "Beyond the Internal Combustion Engine: The Promise of Methanol Fuel Cell Vehicles" (2000).
City and County of Denver Department of Environmental Health, "Fueling Alternatives, A Guide to Alternative Fuels Station Design" (1999).

AFV Selection

A lack of available AFV models has recently become a concern, particularly with respect to gaseous fuel (CNG and LPG) vehicles. As previously mentioned, many OEMs have stopped offering natural gas LDVS. Also, there are no longer OEM offerings of LPG, electric, or M85 (85 percent methanol, 15 percent gasoline) vehicles. This limits the options for fleets and could damage gains these fleets have made through investments in natural gas or LPG infrastructure. As of January 2008, few fleets have access to E85 refueling infrastructure. A number of fleets, however, do have access to LPG or CNG refueling but vehicles that run on these fuels are not available for acquisition. DOE cannot require fleets to utilize conversions to fill this void, and conversion manufacturers must meet EPA testing requirements (which are provided in EPA's Memorandum 1A, available in original form at: http://www.epa.gov/Compliance/resources/policies/civil/caa/mobile/tamper-memo1a.pdf, and modified most recently in June 1998, available at: http://www.epa.gov/EPA-AIR/1998/June/Day-16/a15845.htm).

At present, most of the light-duty AFVs available from OEMs are FFVs, and there has been continued growth in models available with this configuration. Not all models and vehicle sizes, however, are available as FFVs. In some cases, especially in the Federal fleet, agencies purchase

vehicles that are larger than necessary (e.g., a minivan instead of a sedan) to meet the AFV requirement, yet they are fueled with gasoline because E85 is not readily available. In some cases, this has the unintended consequence of actually increasing the amount of petroleum the fleet uses.

A related issue concerns HEVs. There is considerable interest in having hybrids considered AFVs for compliance with the AFV acquisition requirement. Hybrids, however, operate on gasoline and receive only a small amount of their power from self-generated electricity. More important is the broader concept that the EPACT fleet programs were designed to put AFVs on the road, with a subsequent objective of expanding infrastructure to provide alternative fuel for these vehicles, and thus reduce petroleum use. HEVs and other high efficiency technologies, which do reduce petroleum use, do not expand the use of alterative fuels or grow alternative fuel infrastructure directly. However, HEVs may be included as elements of alternative compliance approaches for state or AFP fleets under Section 703 of EPACT 2005. Federal fleets can also benefit from HEVs through reduced petroleum consumption in accordance with E.O. 13423.

EISA expanded the list of potentially creditable actions for state and AFP fleets to include hybrids and several other vehicle types (42 U.S.C. 13258). EISA requires DOE to conduct a rulemaking to determine the level of credit such vehicles would receive toward compliance with EPACT Title V fleet requirements. Section 2862 of the National Defense Authorization Act for FY 2008 (Public Law No: 110-181) expands the definition of AFVs for Federal fleets to include hybrid vehicles (as well as advanced lean burn technology vehicles).

Limited Regulatory Scope

EPACT 1992 provisions focus on accelerating the demand for AFVs, and thereby seeking to increased alternative fuel acceptance. Mandating the purchase of AFVs by certain fleets was included to solve part of the "chicken-and-egg" dilemma, i.e., if sufficient AFVs were acquired, fuel retailers would have an incentive to install infrastructure for these vehicles. As noted above, the EPACT 1992 provisions have no requirements for fuel retailers to install the infrastructure, and DOE is specifically prohibited from placing this requirement on retailers under Section 504(c) of EPACT 1992 [42 U.S.C. 13254(c)].

EPACT 1992 has led to regulated fleets purchasing AFVs, but has contributed negligibly to a larger market acceptance of AFVs, alternative fuels, or a reduction in AFV costs, as regulated fleets simply do not represent a large enough percentage of the total vehicle population to have such an impact. EPACT-covered fleet demand is about 20,000 to 30,000 new AFVs each year, compared to the 16 million or so new vehicles acquired each year in the country as a whole.

Another limitation of the EPACT 1992 provisions is that originally the provisions only required alternative fuel use by AFP fleets. EPACT 2005 strengthened the requirement for Federal fleets to use alternative fuel in AFVs, while adding a waiver process for exemption from this fuel use requirement [42 U.S.C. 13251(a)(4) and 42 U.S.C. 6374(a)(3)(E)]. With enactment of this legislation, Federal agencies covered by EPACT 1992 are specifically required to use alternative fuel in dual-fuel AFVs unless they receive waivers from DOE, which will enhance the

petroleum-reduction impact of these fleets. Although many Federal agencies requested and were awarded waivers from this requirement for FY 2008 by DOE, agencies are expected to increase alternative fuel use through constructing on-site infrastructure and partnering with other agencies to install infrastructure. As agencies make these investments, alternative fuel use in Federal vehicles is expected to increase.

Additional limitations may arise from the fact that Federal fleets may not avail themselves of flexibility afforded to State and AFP fleets. For example, compliance with EPACT 1992 is achieved by the acquisition of AFVs and the purchase and use of biodiesel. Federal agencies receive one EPACT-credit for each AFV they acquire, and receive extra credits for acquiring dedicated (as opposed to flex- or bi-fuel vehicles) AFVs. One EPACT-credit is awarded for each 450 gallons of biodiesel used in blends of 20 percent biodiesel, up to 50 percent of a fleet's acquisition requirements. If a fleet uses biodiesel as B20, it is receiving one credit for every 2,250 gallons of B20 blend. However, State and AFP fleets can carry credits from AFV acquisitions (but not from biodiesel) over from year to year and can bank and trade or sell these credits, whereas Federal fleets cannot bank and trade or sell credits, a potential limitation on the ability of Federal fleets to make greater strides.

Although EPACT 1992 does not require state fleets to use alternative fuels, many are doing so voluntarily. Demand for alternative fuel has not kept pace with the number of vehicles placed on the road by these initiatives. Because most AFVs are dual-fuel vehicles (like FFVs or bi-fuel gaseous vehicles), many fleets can continue to comply with EPACT AFV acquisition requirements while fueling with gasoline instead of the alternative fuel.

The AFV requirements of EPACT 1992 apply only to LDVs. There are no requirements for medium- and heavy-duty AFVs. Although the use of biodiesel in conventional medium-duty vehicles (MDVs) and HDVs decreased petroleum usage somewhat, fleets may decrease the number of AFVs required simply by purchasing a higher number of MDVs instead of LDVs, because MDVs are excluded from coverage. Analysis of Federal agency purchases of vehicles in FAST shows that several agencies have significantly increased MDV purchases. If this purchase trend is in response to the AFV requirement, the result is the acquisition of less fuel efficient vehicles and increased petroleum use.

Increased Costs

Another obstacle to greater use of alternative fuels is the additional cost of alternative fuels. Biofuels prominent in 2008 are generally more expensive than conventional petroleum.[38] Ethanol prices fluctuate and can cost $0.50/GGE more than gasoline, even after taking into consideration the Federal tax credit. For information on ethanol prices, see the Clean Cities' Alternative Fuel Price Report at: www.eere.energy.gov/afdc/resources/pricereport/price_report.html. After applying the $1/gallon Federal tax credit, biodiesel (B100) can also cost $0.50/gallon more than conventional diesel (although B20 blends are now relatively close in price to and are sometimes less expensive than

[38] Clean Cities Initiative, *Alternative Fuel Price Report*, February 2006, www.eere.energy.gov/afdc/resources/pricereport/pdfs/afpr_feb_06.pdf.

petroleum diesel).

CNG and LNG vehicles are typically less expensive than conventional fuel vehicles, but natural gas AFVs are significantly more expensive than conventional vehicles. Light-duty natural gas vehicles may cost over $4,000 more than a similar conventional vehicle. LPG LDVs have incremental costs of at least $2,000, while electric vehicles, when available, had incremental costs as high as $20,000.[39] FFVs are the exception; they typically have no incremental costs due to their minimal hardware changes required and the available CAFE credit value.

Refueling infrastructure costs are also a concern. Many fleets already have gasoline or diesel refueling infrastructure. Retrofitting these facilities for alternative fuel would result in significant costs. Typical LDV fleets do not consume enough fuel to make it cost effective to invest in the special infrastructure that most alternative fuels require.

Unregulated niche markets, such as heavy-duty refuse trucks and transit buses, contribute to alternative fuel infrastructure growth. Niche activity centers with large concentrations of HDVs, such as airports, also have reasonable success with alternative fuels. These vehicles return to home base for refueling each day, minimizing the number of refueling stations required. The extremely high fuel use of these heavy-duty fleet vehicles makes the infrastructure investment much more cost-effective. A side benefit of these large fueling stations is that they are often shared with light-duty support fleets like taxi cabs, shuttle vans, and security vehicles. However, the sustainability of the infrastructure depends on the high fuel-use large vehicles. Smaller groups of LDV fleets without their own petroleum infrastructure usually lack the concentration of vehicles (and thus fuel demand) necessary to justify alternative fuel infrastructure construction.

Projected Impacts of EPACT 2005

EPACT 2005 includes a number of changes to the fleet provisions contained in EPACT 1992, including:

- A requirement for Federal agencies to use alternative fuels in dual-fuel vehicles (Section 701) unless the agency receives a waiver from DOE [42 U.S.C. 6374(a)(3)(E)];
- A requirement concerning the cost allocations made for vehicles Federal fleets acquire (Section 702) [42 U.S.C. 13212(c)];
- An alternative compliance provision for state and AFP fleets (Section 703) (42 U.S.C.13263a);
- An exclusion for certain electric utility emergency vehicles (Section 707) [42 U.S.C. 13211(9)(E)]; and
- Additional reporting requirements for DOE (Sections 704 and 1831).

Because DOE is still in the process of implementing these recently adopted provisions, it is too early to measure the impact these changes may have on petroleum demand. Moreover, reporting

[39] Congressional Research Service, *Alternative Transportation Fuels and Vehicles: Energy, Environment, and Development Issues*, page 20 (January 2005).

cycles for EPACT are based on either the fiscal year (for Federal fleets), which closes on September 30, or the model year (MY) (state and AFP fleets), which closes on August 31. Therefore, the initial impact of these provisions can only begin to be discernable once reports are available during late 2008 or early 2009.

A number of tax incentives related to AFVs, alternative fuels, and alternative fuel infrastructure were also included in this legislation. Sections 1341, 1342, and 1344 of EPACT 2005 provide tax incentives for vehicles, alternative fuel infrastructure, and alternative fuels. These incentives are not directly available to regulated government fleets but are available to most voluntary fleets, AFPs, and consumers. However, regulated fleets, even those that do not directly qualify for the tax incentives, may benefit from partnering or negotiating with other organizations to receive discounted prices for fuel, infrastructure, and vehicles. These incentives are anticipated to expand the market for AFVs and alternative fuels, but the impact of these incentives on regulated fleets is not clear to date.

Federal Fleet Fuel Use Requirement

Section 701 of EPACT 2005 strengthens Section 400AA(a)(3)(E) of the Energy Policy and Conservation Act (EPCA) by revising Section 400AA(a)(3)(E) to require that Federal dual-fueled vehicles "shall be operated on alternative fuels unless the Secretary [of Energy] determines that an agency qualifies for a waiver of such requirement" [42 U.S.C. 6374 (a)(3)(E)]. EPCA generally governs the Federal government's acquisition of AFVs, including vehicles acquired pursuant to EPACT 1992. The amendment clarifies that Federal agencies are expected to operate their dual-fuel vehicles on alternative fuels and requires Federal agencies to seek a waiver if this is not feasible. The Secretary of Energy may waive the fuel use requirement if alternative fuels are not reasonably available for retail purchase or the cost of alternative fuels is unreasonably more expensive than gasoline [42 U.S.C. 6374(a)(3)(E)]. In both instances, the head of the agency seeking a waiver must certify that it is necessary. Waivers are submitted to DOE for review and approval and are effective for one fiscal year. The Secretary is also required to monitor and report to Congress on compliance with this provision. The EPCA Section 400AA(a)(3)(E) fuel use provision (as revised) is consistent with the requirement of E.O.13423 and re-enforces the requirements of EPACT 1992 Section 302(a)(1)(E) [42 U.S.C. 6374(a)(1)(E)].

DOE developed guidance to implement the above requirement, available at: www.eere.energy.gov/vehiclesandfuels/epact/pdfs/701_guidance.pdf. The amendment in EPACT 2005 increases the accountability of Federal fleets because they previously have not had to request waivers from DOE. DOE believes that most Federal agencies have been using alternative fuels in those locations where the fuel is available but DOE has not always been able to pinpoint locations that could benefit from alternative fuel infrastructure, i.e., locations where more fueling is needed for agencies operating dual-fuel vehicles. The waiver procedures will improve DOE's ability to identify problems fleets are having in using alternative fuels. It will also help DOE identify specific locations in need of refueling infrastructure, and may also quantify the potential demand at such locations.

In addition, EISA effectively incorporates the petroleum reduction and alternative fuel use requirements of E.O. 13423 into legislation. EISA Section 246 will also facilitate the use of alternative fuels in Federal fleets. Specifically, under Section 246, the installation of at least one renewable fuel pump is required by 2010 at each Federal fleet fueling center in the U.S. that is under the jurisdiction of the head of a Federal agency (42 U.S.C. 17053).

Incremental Cost of AFVs

Section 702 of EPACT 2005 amends Section 303(c) of EPACT 1992 to require that the GSA and "any other Federal agency that procures vehicles for distribution to other Federal fleets shall allocate the incremental cost of [AFVs] over the cost of comparable gasoline vehicles across the entire fleet of motor vehicles distributed by such agency" [42 U.S.C. 13212(o)]. Section 303 previously provided discretionary authority to spread the incremental cost (both purchase and operating) of AFVs across the cost of all vehicles acquired by Federal fleets (using "may" rather than "shall"). Several years ago, GSA began exercising the Section 303 discretionary authority in negotiations with selected agencies (including DOE) and established voluntary programs to spread the incremental cost of AFVs across all vehicles agencies lease from GSA. With the enactment of EPACT 2005, GSA expanded this program to all agencies and developed individual surcharges for each agency EPACT 1992 covers, so that the vehicle-lease cost from GSA is the same regardless of whether the vehicle is a conventional or AFV vehicle.

Alternative Compliance

Section 703 of EPACT 2005 amends the EPACT 1992 Title V requirements for state government and AFP fleets to allow these fleets to craft alternative compliance strategies. Amended Section 513 permits fleets to request a waiver to pursue petroleum reduction strategies in lieu of acquiring AFVs (42 U.S.C. 13263a). Fleets must petition DOE to receive a waiver. The petitions must demonstrate that the fleet is capable of implementing alternative compliance measures that will produce a level of petroleum reduction equivalent to the amount that would have been reduced had the fleet otherwise continued to meet its EPACT 1992 AFV acquisition requirements and operated its AFVs 100 percent of the time on alternative fuels.

After publishing a final rule on March 20, 2007 (72 FR 12958), DOE developed guidance implementing this provision (available at www.eere.energy.gov/vehiclesandfuels/epact/pdfs/alt_comp_guide.pdf). Implementation of this program began during MY 2008. Several state and AFP fleets expressed interest in an alternative compliance program, with nine fleets having been approved for participation during the first year of eligibility. This program will provide added flexibility by allowing fleets to pursue a variety of petroleum reduction strategies. DOE believes, however, that because of the high bar set by Section 703, most fleets will need to use some alternative fuel to meet the alternative compliance program's requirements. Thus, the alternative compliance program should continue to result in demand for AFVs and alternative fuel. Most notable about the alternative compliance approach is that fleets will have the flexibility to comply using petroleum reductions attributable to fuel efficiency improvements, including the use of HEVs.

Emergency Vehicles

Section 707 of EPACT 2005 amends the list of excluded emergency vehicles in Section 301(9) of EPACT 1992 to add a new category of vehicles. The vehicles this amendment excludes are "vehicles directly used in the emergency repair of transmission lines and in the restoration of electricity service following power outages, as determined by the Secretary" [42 U.S.C. 13211(9)(E)].

DOE published a notice indicating the availability of guidance implementing this provision.[40] The guidance provides an overview of the types of vehicles DOE believes would qualify for this exclusion and instructs fleets that they must request exclusions for these vehicles from DOE. Excluded vehicles are not counted when determining a fleet's annual AFV requirement or if a fleet is covered under EPACT 1992. Thus, it is possible this provision could result in fewer AFV acquisitions and less alternative fuel use.

At this time, DOE is uncertain how this change may affect the number of fleets or vehicles covered by its fleet regulations. DOE believes, however, that the change is primarily relevant to fuel providers and that it will not affect many vehicles overall. This is because most of the relevant vehicle types are already excluded from EPACT 1992 because they are medium- and heavy-duty utility crew trucks or LDVs that under normal operations are garaged at personal residences at night.

Summary and Conclusions

In combination, the DOE programs Titles III through V established are mutually reinforcing, because the Clean Cities voluntary efforts help regulated fleets deploy AFVs and alternative fuels, and the regulated fleets serve as a springboard for the voluntary alternative fuel-related efforts. Overall, the EPACT programs displace hundreds of millions of gallons of petroleum annually. This amount, however, is less than one percent of the approximately 175 billion gallons of petroleum used on the nation's highways each year.

A number of obstacles have limited the ability of covered fleets from using increased amounts of alternative fuels. Most importantly, spotty alternative fuel infrastructure location, narrow AFV selection, limited regulatory scope that requires only some fleets to purchase alternative fuel, increased costs, and low oil prices through 2004 hindered the potential of EPACT 1992 programs to meet the broader EPACT 1992 goal of replacing petroleum.

Covered fleets have met or exceeded EPACT 1992 AFV-acquisition requirements in recent years. Cumulatively they have purchased nearly 200,000 AFVs between 1992 and 2005-2006.[41]

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[40] 70 FR 70703 (Nov. 23, 2005).

[41] Federal fleet data submitted to the Federal Automotive Statistical Tool (FAST) through FY2005 (compliance submittals); State and AFP fleet data submitted through 2006 (annual compliance reports); and Clean Cities data reported by program stakeholders (includes some light-duty AFVs in regulated fleets).

Voluntary fleets have also acquired more than 290,000 AFVs.[42] These achievements, however, have a limited impact on petroleum replacement. Together, the total 2006 U.S. inventory of 635,000[43] mandatory and voluntary AFV acquisitions and represent less than 1 percent of the nearly 251 million[44] vehicles on U.S. roads in 2006. Combined, the Clean Cities program and AFV fleets, along with hybrid electric vehicles, low-level blends of alternative fuel, idle reduction technologies, and fuel economy measures, have cumulatively displaced more than 1.6 billion GGE of petroleum between 1992 and 2006,[45] or only less than 1 percent of highway motor fuel usage during only 2006.

On March 6, 2007, DOE adopted a revised replacement fuel goal (72 FR 12041; Mar. 15, 2007). DOE determined through its analysis that the 30 percent Replacement Fuel Goal Congress established under Section 502(b)(2) of EPACT 1992 (42 U.S.C. 13252(b)(2)) cannot be met by 2010. DOE determined that the 30 percent goal can be achieved by 2030, and DOE revised the replacement fuel goal accordingly. In this context, the purchase of 30,000 AFVs and the displacement of 100 million gallons of gasoline annually by the EPACT 1992 programs is minimal when compared to the 16 to 18 million vehicles sold in the United States consuming approximately 175 billion gallons of highway motor fuel annually. The fleets covered by these programs represent only a small portion of the vehicles on U.S. roads today and an even smaller portion of the nation's motor vehicle fuel use. AFV acquisitions in these programs alone are not large enough to catalyze the market for AFV production, influence model offerings, or have significant impact on infrastructure development. It would likely take a much broader national program to have a substantial impact on the alternative fuel markets or U.S. dependence on petroleum.

Since EPACT 1992 was enacted, there have been many changes in AFV technologies, the AFV market, and in alternative fuel infrastructure. Because other factors—such as the price of oil and the availability of CAFE credits for AFVs—have affected AFVs and infrastructure development, the precise extent to which EPACT 1992 has affected the AFV and alternative fuel markets is not certain. Also uncertain is the impact EPACT 2005 will have on AFV technology development. As many EPACT 2005 provisions are only now beginning to be implemented, it will take time to assess the complete gains of the EPACT 2005 programs.

More models of AFVs have been developed than would have been otherwise had EPACT programs not existed to serve as launching pads for and opportunities to debug alternative fuel technologies. MY 1993 OEM offerings included 12 AFV models, mostly in limited volumes,

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[42] Figure based on data Federal, state, AFP, and Clean Cities stakeholder fleets have submitted. *See infra* Table 1.

[43] Energy Information Administration, "Estimated Number of Alternative Fueled Vehicles in Use in the United States, by Fuel Type, 2003 – 2006", http://www.eia.doe.gov/cneaf/alternate/page/atftables/afvtrans_v1.xls (Dec. 8, 2008).

[44] Bureau of Transportation Statistics, "Number of U.S. Aircraft, Vehicles, Vessels, and Other Conveyances", http://www.bts.gov/publications/national_transportation_statistics/html/table_01_11.html (Dec. 8, 2008).

[45] Estimated fuel use based on Clean Cities annual questionnaire results.

whereas MY 2008 offerings exceeded 33 different AFV models.[46] This has not always led to equivalent pricing of the vehicles themselves. Historically, AFVs and AFV conversion kits have cost more to purchase than conventional gasoline vehicles, from a few hundred to several thousand dollars.

While DOE believes that costs for AFV technology have declined since EPACT was enacted, it is not clear that the EPACT programs are solely responsible for this decline, or that they even significantly contributed to cost reductions. Regulated and voluntary fleets have acquired thousands of AFVs, however, demand for AFVs as a result of the EPACT 1992 programs has not been large enough to affect the cost of AFVs. Because the demand for AFVs (or vehicles of any kind) by the fleets subject to the EPACT 1992 requirements is minor relative to general consumer demand, manufacturers may not have responded wholly to EPACT fleet demand with additional AFV models. However, OEMs developed and produced more than six million FFVs in several different models, most likely in response to the CAFE program (49 U.S.C. 32901 et seq.). Some of these FFV models are not necessarily the types of vehicles covered fleets would use in their normal business practices. DOE believes that the cost differential now is negligible to non-existent for certain ethanol technologies, because there are minimal hardware changes required for FFVs and there exists available CAFE credit value for FFVs. For other technologies, however, price differentials remain. For example, the cost of a natural gas AFV is still significantly higher than that of the conventional version vehicle.

The impact of AFV-acquisition requirements at the national level is small. There are nearly 251 million vehicles on the road in the United States using approximately 175 billion gallons of petroleum annually. By comparison, the Federal fleet (the only EPACT 1992 fleet for which DOE tracks total inventory of vehicles) includes over 600,000 vehicles, less than 1 percent of the total number of vehicles in the United States. Even if State, AFP, and voluntary fleets combined include twice as many vehicles as the Federal fleet, this total (1.2 million plus 600,000) represents only 0.8 percent of the total U.S. fleet. In addition, these fleet figures represent almost entirely LDVs, which use significantly less fuel on a per-vehicle basis than MDVs and HDVs. Thus, the overall impact on U.S. petroleum consumption and alternative fuel use is, by virtue of the small number of LDV EPACT 1992 fleets represent, minimal.

The programs are not large enough to catalyze the market for AFVs in terms of the total number of vehicles and the number of model offerings. Also, except in specific locations (such as the Midwestern region and E85) the number of EPACT fleet AFVs is insufficient to spur alternative fuel infrastructure development. Nevertheless, the AFV requirements may serve to demonstrate technology and educate potential consumers. DOE believes that these fleet programs continue to demonstrate the practicality and benefits of alternative fuels to the communities in which these fleets operate. The programs educate fleet operators and other consumers on these technologies and set the stage for expansion into the broader marketplace.

[46] U.S. DOE, Energy Efficiency and Renewable Energy, Alternative Fuels & Advanced Vehicles Data Center, "OEM AFV/HEV/Diesel Light Duty Model Offerings by Fuel Type 1991-2008", at http://www.afdc.energy.gov/afdc/data/docs/afv_models_fuel_type.xls (Dec. 9, 2008).

EISA's primary elements are the expansion of the Renewable Fuel Standard and an increase in CAFE standards. These two provisions will affect the broader set of the U.S. vehicle inventory. The Renewable Fuel Standard mandates that conventional motor fuels sold in the U.S. contain a minimum volume of renewable fuel, and thus this provision will increase the volume of renewable fuels deployed. The CAFE standards have the potential for significant reductions in petroleum consumption, because by definition the standards will increase the fuel efficiency of vehicular transportation. However, neither of these two programs, alone or in combination, includes fueling infrastructure demands akin to those under which the fleet programs operate. The fleet programs contain incentives necessary to help ensure the sure and steady growth of a sustainable alternative fuel infrastructure. As such, the fleet programs are capable of achieving gains toward the complete set of goals set forth in EPACT 1992 and EPACT 2005, of decreasing U.S. dependence on imported oil.

The EPACT fleet programs have provided, and continue to provide, an opportunity to develop acceptance of diverse fuels and technologies on the part of Federal, State, and AFP fleets. The programs also reveal obstacles to deploying more AFVs and ensuring a diverse fuel supply for the U.S. vehicular transportation sector. Fleet programs grow infrastructure and help ensure OEMs are developing AFVs. The programs also help reveal the importance of Federal role but also that multiple market segments are necessary to achieve full achievement of the EPACT 1992 and EPACT 2005 goals. Nonetheless, the replacement fuels and efficiency pillars of EISA are expected to have the greatest potential to achieve significant reductions in U.S. highway motor fuel use.

Acronyms

AFP	Alternative Fuel Provider
AFV	Alternative Fuel Vehicle
B100	100 percent biodiesel
CAFE	Corporate Average Fuel Economy
CNG	Compressed Natural Gas
DOE	U.S. Department of Energy
E85	Ethanol (85 percent ethanol, 15 percent petroleum)
EISA	Energy Independence and Security Act of 2007
E.O.	Executive Order
EPA	Environmental Protection Agency
EPACT	Energy Policy Act
FAST	Federal Automotive Statistical Tool
FFV	Flexible Fuel Vehicle
FY	Fiscal Year
GGE	Gasoline Gallon Equivalent
GSA	General Services Administration
HDV	Heavy-Duty Vehicle
HEV	Hybrid Electric Vehicle
INL	Idaho National Laboratory
lbs	Pounds
LDV	Light-Duty Vehicle
LNG	Liquefied Natural Gas
LPG	Liquefied Petroleum Gas (Propane)
mpg	Miles per Gallon
M85	Methanol (85 percent methanol, 15 percent gasoline)
MSA/CMSA	Metropolitan Statistical Area/Consolidated Metropolitan Statistical Area
MDV	Medium-Duty Vehicle
MY	Model Year
NHTSA	National Highway Traffic Safety Administration
OEM	Original Equipment Manufacturer
PHEV	Plug-In Hybrid Electric Vehicle

Appendix: Authorizing Legislation Referenced in this Report

EPACT 2005 Sections 704 and 1831: Review of EPACT 1992 Programs

(a) IN GENERAL. Not later than 180 days after the date of enactment of this section, the Secretary shall complete a study to determine the effect that titles III, IV, and V of the Energy Policy Act of 1992 (42 U.S.C. 13211 et seq.) have had on—
(1) The development of alternative fuel vehicle technology.
(2) The availability of that technology in the market.
(3) The cost of alternative fueled vehicles.
(b) TOPICS. As part of the study under subsection (a), the Secretary shall specifically identify—
(1) The number of alternative fueled vehicles acquired by fleets or covered persons required to acquire alternative fueled vehicles.
(2) The quantity, by type, of alternative fuel actually used in alternative fueled vehicles acquired by fleets or covered persons.
(3) The quantity of petroleum displaced by the use of alternative fuels in alternative fueled vehicles acquired by fleets or covered persons.
(4) The direct and indirect costs of compliance with requirements under titles III, IV, and V of EPACT 1992 (42 U.S.C. 13211 et seq.), including—
(A) Vehicle acquisition requirements imposed on fleets or covered persons.
(B) Administrative and recordkeeping expenses.
(C) Fuel and fuel infrastructure costs.
(D) Associated training and employee expenses.
(E) Any other factors or expenses the Secretary determines to be necessary to compile reliable estimates of the overall costs and benefits of complying with programs under those titles for fleets, covered persons, and the national economy.
(5) The existence of obstacles preventing compliance with vehicle acquisition requirements and increased use of alternative fuel in alternative fueled vehicles acquired by fleets or covered persons.
(6) The projected impact of amendments to EPACT 1992 made by this title.
(c) REPORT. Upon completion of the study under this section, the Secretary shall submit to Congress a report that describes the results of the study and includes any recommendations of the Secretary for legislative or administrative changes concerning the alternative fueled vehicle requirements under titles III, IV, and V of EPACT 1992 (42 U.S.C. 13211 et seq.).

NOTE: Text is identical for both sections 704 and 1831.

EPACT 1992 Section 501: Mandate for Alternative Fuel Providers

(a) IN GENERAL- (1) The Secretary shall, before January 1, 1994, issue regulations requiring that of the new light duty motor vehicles acquired by a covered person described in paragraph (2), the following percentages shall be alternative fueled vehicles for the following model years:

(A) 30 percent for model year 1996.
(B) 50 percent for model year 1997.
(C) 70 percent for model year 1998.
(D) 90 percent for model year 1999 and thereafter.

(2) For purposes of this section, a person referred to in paragraph (1) is:

(A) A covered person whose principal business is producing, storing, refining, processing, transporting, distributing, importing, or selling at wholesale or retail any alternative fuel other than electricity.

(B) A non-Federal covered person whose principal business is generating, transmitting, importing, or selling at wholesale or retail electricity. or

(C) A covered person:

(i) Who produces, imports, or produces and imports in combination, an average of 50,000 barrels per day or more of petroleum, and

(ii) A substantial portion of whose business is producing alternative fuels.

(3)(A) In the case of a covered person described in paragraph (2) with more than one affiliate, division, or other business unit, only an affiliate, division, or business unit which is substantially engaged in the alternative fuels business (as determined by the Secretary by rule) shall be subject to this subsection.

(B) No covered person or affiliate, division, or other business unit of such person whose principal business is:

(i) Transforming alternative fuels into a product that is not an alternative fuel, or

(ii) Consuming alternative fuels as a feedstock or fuel in the manufacture of a product that is not an alternative fuel, shall be subject to this subsection.

(4) The vehicles purchased pursuant to this section shall be operated solely on alternative fuels except when operating in an area where the appropriate alternative fuel is unavailable.

(5) Regulations issued under paragraph (1) shall provide for the prompt exemption by the Secretary, through a simple and reasonable process, from the requirements of paragraph (1) of any covered person, in whole or in part, if such person demonstrates to the satisfaction of the Secretary that:

(A) Alternative fuel vehicles that meet the normal requirements and practices of the principal business of that person are not reasonably available for acquisition; or

(B) Alternative fuels that meet the normal requirements and practices of the principal business of that person are not available in the area in which the vehicles are to be operated.

(b) REVISIONS AND EXTENSIONS. With respect to model years 1997 and thereafter, the Secretary may:

(1) Revise the percentage requirements under subsection (a)(1) downward, except that under no circumstances shall the percentage requirement for a model year be less than 20 percent; and

(2) Extend the time under subsection (a)(1) for up to 2 model years.

(c) OPTION FOR ELECTRIC UTILITIES. The Secretary shall, within 1 year after the date of enactment of this Act, issue regulations requiring that, in the case of a covered person whose principal business is generating, transmitting, importing, or selling at wholesale or retail electricity, the requirements of subsection (a)(1) shall not apply until after December 31, 1997, with respect to electric motor vehicles. Any covered person described in this subsection which plans to acquire electric motor vehicles to comply with the requirements of this section shall so notify the Secretary before January 1, 1996.

(d) REPORT TO CONGRESS. The Secretary shall, before January 1, 1998, submit a report to the Congress providing detailed information on actions taken to carry out this section, and the progress made and problems encountered there under.