



THE SECRETARY OF TRANSPORTATION
WASHINGTON, DC 20590

September 19, 2014

The Honorable John D. Rockefeller IV
Chairman
Committee on Commerce,
Science, and Transportation
United States Senate
Washington, DC 20510

Dear Mr. Chairman:

I am pleased to provide you the Report to Congress on the Evaluation of the Effectiveness of the Zero-Emission Airport Vehicles and Infrastructure Pilot Program, as required by the FAA Modernization and Reform Act of 2012, section 511.

This program allows the Federal Aviation Administration to award Airport Improvement Program funds to airport sponsors for the acquisition of zero-emission vehicles and associated infrastructure.

I have sent a similar letter to the Ranking Member and the Chairmen and Ranking Members of the Committee on Science, Space, and Technology and the Committee on Transportation and Infrastructure.

Sincerely,

A handwritten signature in blue ink, appearing to read "Anthony R. Foxx", is positioned above the printed name. The signature is fluid and cursive.

Anthony R. Foxx

Enclosure



THE SECRETARY OF TRANSPORTATION
WASHINGTON, DC 20590

September 19, 2014

The Honorable Lamar Smith
Chairman
Committee on Science,
Space, and Technology
U.S. House of Representatives
Washington, DC 20515

Dear Mr. Chairman:

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Anthony R. Foxx

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September 19, 2014

The Honorable Bill Shuster
Chairman
Committee on Transportation
and Infrastructure
U.S. House of Representatives
Washington, DC 20515

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THE SECRETARY OF TRANSPORTATION

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September 19, 2014

The Honorable John Thune
Ranking Member
Committee on Commerce, Science,
and Transportation
United States Senate
Washington, DC 20510

Dear Senator Thune:

I am pleased to provide you the Report to Congress on the Evaluation of the Effectiveness of the Zero-Emission Airport Vehicles and Infrastructure Pilot Program, as required by the FAA Modernization and Reform Act of 2012, section 511.

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THE SECRETARY OF TRANSPORTATION
WASHINGTON, DC 20590

September 19, 2014

The Honorable Eddie Bernice Johnson
Ranking Member
Committee on Science,
Space, and Technology
U.S. House of Representatives
Washington, DC 20515

Dear Congresswoman Johnson:

I am pleased to provide you the Report to Congress on the Evaluation of the Effectiveness of the Zero-Emission Airport Vehicles and Infrastructure Pilot Program, as required by the FAA Modernization and Reform Act of 2012, section 511.

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THE SECRETARY OF TRANSPORTATION

WASHINGTON, DC 20590

September 19, 2014

The Honorable Nick J. Rahall, II
Ranking Member
Committee on Transportation
and Infrastructure
U.S. House of Representatives
Washington, DC 20515

Dear Congressman Rahall:

I am pleased to provide you the Report to Congress on the Evaluation of the Effectiveness of the Zero-Emission Airport Vehicles and Infrastructure Pilot Program, as required by the FAA Modernization and Reform Act of 2012, section 511.

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**Federal Aviation
Administration**

Report to Congress

Evaluation of the Effectiveness of the Zero-Emission Airport Vehicles and Infrastructure Pilot Program



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Evaluation of the Effectiveness of the Zero-Emission Airport Vehicles and Infrastructure Pilot Program

The FAA Modernization and Reform Act of 2012 (Public Law 112-95, hereafter referred to as “the Act”) created a new section in title 49, United States Code (USC), section 47136a (49 USC § 47136a), Zero-emission Airport Vehicles and Infrastructure (hereafter referred to as “the statute”). This provision, found in section 511 of the Act, establishes a pilot program allowing FAA to award Airport Improvement Program (AIP) funds for the acquisition of zero-emission vehicles (ZEVs) at an airport and includes eligibility for the construction or modification of infrastructure to facilitate the delivery of fuel and services necessary for the use of such vehicles.

The FAA is required, per section 511 of the Act, to report to certain congressional committees with an evaluation of the effectiveness of the ZEV Pilot Program. These committees are:

U.S. House of Representatives:

Committee on Science, Space, and Technology
Committee on Transportation and Infrastructure

U.S. Senate:

Committee on Commerce, Science, and Transportation

1. IMPLEMENTATION OF SECTION 511

On December 11, 2012, in response to the statute, FAA finalized a Technical Guidance document containing detailed instructions for implementing the ZEV Pilot Program. This Technical Guidance was distributed via a Program Guidance Letter to the FAA staff within the Office of Airports. It was also posted on the FAA’s Web site for public access. Together, these instructions provided the FAA grant management staff and field offices the ability to solicit interest from airport sponsors for participation in the ZEV Pilot Program in anticipation of the Fiscal Year (FY) 2013 grant cycle.

1.1 Eligibility

Per the statute, the Technical Guidance issued by FAA adopted the definition of ZEV found in title 40 Code of Federal Regulations (CFR), §§ 88.102-94 and 105-94, which defines vehicle tailpipe standards for light-duty cars and trucks and heavy-duty engines. To meet ZEV standards, the vehicle must produce zero exhaust of any criteria pollutant (or pollutant precursor). In most cases, this will be a vehicle that has an all-electric or hydrogen-powered

drive train and is legal to transport people and/or cargo on roads and highways. Hybrid gas/electric vehicles are considered ineligible for the ZEV Pilot Program because they do not meet these ZEV emission standards. They do not meet these standards because at certain times their gasoline engines could be engaged.

To be eligible for funding through the ZEV Pilot Program, the vehicles must be owned by the airport sponsor and used exclusively on the airport for airport purposes. The vehicles must be an integral part of the aeronautical, transportation, security, or maintenance services at the airport. The ZEV Pilot Program is for capital costs only and does not extend to operational or maintenance costs of the vehicles. Except in limited circumstances, implementation of AIP projects must use demonstrated materials and technology available on the commercial market; “demonstration” projects are not eligible for AIP funding. For this reason, FAA limited funding for the ZEV Pilot Program to commercially available vehicles.

All vehicles purchased under the ZEV Pilot Program must meet the AIP “Buy American” requirements. Under these provisions, the statute requires that all steel and manufactured goods used in AIP-funded projects be produced in the United States. In accepting AIP funding, grant recipients must certify that all steel or manufactured products used on any portion of the AIP-funded project are produced in the United States and are of 100 percent U.S. materials. The FAA may consider issuing a waiver under certain conditions provided that at least 60 percent of the components used to manufacture the product are made in the United States and that final assembly occurs in the United States.

As specified in the statute, the construction or modification of infrastructure to facilitate the delivery of fuel for ZEVs is eligible for AIP funding. The FAA defines eligible infrastructure as refueling stations, rechargers, on-site fuel storage tanks, and other equipment needed for station operation. The costs for installation of the appropriate infrastructure are also eligible under the ZEV Pilot Program. The capacity of the infrastructure must be commensurate with the number of project vehicles and their fueling requirements. Some limited consideration may be given to allow public access to hydrogen stations and electric recharging stations under certain conditions.

Any public-use airport in the National Plan of Integrated Airport Systems is eligible to receive consideration for AIP funding under the ZEV Pilot Program, although (per the statute) priority will be given to airports located in U.S. Environmental Protection Agency (EPA) designated air quality nonattainment areas.

1.2 Selection Criteria

The FAA has established project selection criteria to give priority for funding applications received under the ZEV Pilot Program to comply with the requirements of the statute. While 49 USC § 47136a(b)(1) specifies that only airports located in EPA designated air quality nonattainment areas can participate in the ZEV Pilot Program, 49 USC § 47136a(b)(2) allows FAA to expand eligibility to airports located in attainment areas if there is a shortage of applicants from nonattainment areas. Since the statute does not give a specific definition of “shortage of applicants,” FAA has developed selection criteria to give priority funding to

projects at airports located in nonattainment areas before funding projects in EPA designated maintenance or attainment areas. Within each air quality category (e.g., nonattainment, maintenance, or attainment), FAA also considers the amount of air quality benefits relative to the cost of the project (measured by emissions reduced per dollar expended under the ZEV Pilot Program) when making funding decisions. Projects with the best cost-effectiveness will receive the highest priority for funding in each respective category.

The FAA will track emission reduction estimates for all projects successfully implemented under the ZEV Pilot Program. The FAA will annually compile a list of successful projects and the emission reductions of oxides of nitrogen (NO_x) and volatile organic compounds (VOCs) associated with each project for each year the project is active. NO_x and VOCs are precursor pollutants contributing the formation of ozone; ozone is the metric that FAA uses to evaluate ZEV Pilot Program applications.

1.3 Federal Funding

The Federal share of any ZEV Pilot Program project is 50 percent of the total project cost including costs for reasonable project formulation and technical assistance. Per 49 USC § 47136a(e)(1), the cost of technical assistance in an application is limited to a maximum of 10 percent of the total ZEV project price. Technical assistance includes any professional services for preparation of the ZEV Pilot Program application and other project formulation costs sought by the sponsor. The statute allows airport sponsors to obtain technical assistance from University Transportation Centers that receive grants under title 49 USC, § 5506, University transportation research. Per 49 USC § 47136a(e)(2), the University Transportation Center must be located in the region where the airport is located. For purposes of the ZEV Pilot Program, FAA defines this as the University Transportation Center located closest to the airport. Sponsors are required to ensure that the University Transportation Center was selected using a competitive, qualifications-based selection process if the airport sponsor seeks reimbursement for the costs incurred from the University Transportation Center.

2. INTEREST IN THE ZEV PILOT PROGRAM

The FAA worked collaboratively with industry representatives, such as the Airports Council International – North America (ACI-NA) and the American Association of Airport Executives (AAAE), as well as with joint FAA/industry workgroups, to advertise the ZEV Pilot Program and assess the level of interest. Partnering with ACI-NA and AAAE allowed FAA to efficiently reach out to over 500 airports to elicit interest in the ZEV Pilot Program. In addition, FAA presented information on the ZEV Pilot Program at several industry conferences and workgroup meetings throughout FY 2013. The FAA also presented a webinar to members of ACI-NA and AAAE with detailed information on eligibility requirements and application procedures.

As a result, airports nationwide have specifically expressed interest in the ZEV Pilot Program. While the majority of interest has come from large- or medium-hub airports, some small- and

nonhub airports have shown interest in the ZEV Pilot Program. As of the date this report was prepared, airports that have expressed interest in the program are located in seven of the FAA's nine regions, including:

- Albany International Airport (Albany, New York)
- Albuquerque International Sunport (Albuquerque, New Mexico)
- Chicago Midway International Airport (Chicago, Illinois)
- Chicago O'Hare International Airport (Chicago, Illinois)
- Dallas/Fort Worth International Airport (Dallas-Fort Worth, Texas)
- Hartsfield-Jackson Atlanta International Airport (Atlanta, Georgia)
- John F. Kennedy International Airport (New York, New York)
- John Wayne Airport–Orange County (Santa Ana, California)
- Lambert-St. Louis International Airport (St. Louis, Missouri)
- Metropolitan Oakland International Airport (Oakland, California)
- Minneapolis-St. Paul International/Wold Chamberlain Airport (Minneapolis, Minnesota)
- Newark Liberty International Airport (Newark, New Jersey)
- Phoenix Sky Harbor International Airport (Phoenix, Arizona)
- Seattle-Tacoma International Airport (Seattle, Washington)
- Stewart International Airport (Newburgh, New York)
- Tampa International Airport (Tampa, Florida)

Because FY 2013 was the first year of implementation, FAA will continue to evaluate airport interest in the ZEV Pilot Program through FY 2015 (the last year of AIP currently authorized under the Act). The FAA will continue to educate airport sponsors on the availability of Federal funding for the purchase of ZEVs and construction of associated infrastructure at conference and workgroup opportunities, particularly the smaller commercial service airports, which may need more technical assistance. Future interest in the program will naturally depend in part on the cost-effectiveness of early initiatives. It will also depend on how well the actual vehicles and infrastructure function in terms of performance, reliability, and operating and maintenance costs.

In April 2013, FAA presented a webinar in cooperation with ACI-NA and AAAE to provide the membership of these two industry groups with specific information on the new ZEV Pilot Program. In several subsequent discussions with airport sponsors and industry groups, FAA received the following feedback regarding ZEV use at airports.

- In general, airport sponsors have expressed interest in ZEVs, and some airports have already started to implement a program to acquire ZEVs without Federal assistance. The types of activities already implemented include the purchase of ZEVs for use by:
 - airport police and security departments;
 - maintenance departments; and
 - airport shuttle vehicles.

In addition to the acquisition of the vehicles, airport sponsors have installed various electric charging stations for use by airport vehicles. Also, several airport sponsors have installed charging stations in public parking garages to accommodate ZEVs driven by the public.

Many airports are incorporating ZEV elements into sustainability plans currently under development or in the process of being implemented.

- Federal assistance may help alleviate some of the stated concerns many airport sponsors have regarding the additional cost of ZEVs. Regardless of whether a particular airport receives Federal funding for a ZEV Pilot Program or develops an independent ZEV program with local funds, FAA will share the best practices and lessons learned from implementation of the ZEV Pilot Program to benefit all airports.
- Airport sponsors are interested in a wide variety of ZEVs to meet various functional needs of the airport, such as:
 - Ground support equipment
 - Light-duty vehicles
 - Small utility vehicles
 - Light-duty trucks
 - Shuttles
 - Buses
 - Maintenance vehicles
 - Security vehicles

All of these types of vehicles are currently commercially available in the United States as ZEVs with either electric or hydrogen-powered motors. However, vehicles in some of these categories currently may not be able to meet the AIP Buy American requirements.

Ground support equipment (GSE), such as baggage carts, belt loaders, catering trucks, deicing vehicles, and tow tractors, are high priorities for airport sponsors. These vehicles are in constant and heavy use at the Nation's busiest airports as they service aircraft on the parking apron or terminal gate in preparation for the next flight. However, the statutory requirements for AIP require that AIP-funded vehicles be owned by the airport sponsor, and the majority of the GSE fleets at airports are not owned by the airport sponsor but by air carriers or airline service contractors.

Moreover, in accordance with section 511 of the Act, FAA has adopted selection criteria based on the definition of ZEV found in title 40 CFR §§ 88.102-94 and 88.104-94. These regulations define ZEVs as light-duty cars or trucks or heavy-duty engines conforming to ZEV emission standards. Further, section 216(2) of the Clean Air Act defines "motor vehicle" as a self-propelled vehicle designed for transporting persons or property on a street or highway. Because GSE vehicles are not intended to transport people and goods on roads or highways, GSE vehicles are ineligible for ZEV funding.¹ Because of the reasons stated above, FAA believes that the current limitation on funding the acquisition of GSEs is appropriate and therefore GSEs are not eligible for funding through the ZEV Pilot Program.

¹ Electric GSEs may be eligible for funding under the Voluntary Airport Low Emission (VALE) Program if certain conditions relating to airport sponsor control of the GSE are met.

- The majority of the concerns expressed by airport sponsors can be grouped into three main categories (cost, reliability, and Federal requirements). Cost of the ZEV was the concern most often stated by airport sponsors. In addition to the higher initial cost of ZEVs compared to conventionally-fueled vehicles, airport sponsors are concerned about life-cycle costs associated with ZEVs, including the cost of electricity to power the vehicles.
- Airport sponsors are also concerned about reliability of ZEVs, especially with respect to battery life and durability of electric vehicles. Given the relatively short time ZEVs have been on the American market, many sponsors are concerned about the “useful life” of the vehicle, which is defined as how long the vehicle may remain in active service at the airport. However, with fewer moving parts compared to conventionally fueled vehicles, some sponsors speculated that ZEVs might have a longer useful life than their conventional counterparts and consequently accrue lower lifetime costs. Related to reliability, sponsors have questions about the ability to rapidly and efficiently repair ZEVs, which would depend on locally available trained mechanics with the required parts and expertise to service the vehicles.
- A few airport sponsors expressed concern with the reporting responsibilities associated with accepting Federal funds. In particular, some airport sponsors expressed a preference not to have to report annual vehicle miles or years of service on vehicles funded through the ZEV Pilot Program. However, FAA believes this information is important to properly evaluate the effectiveness and cost-effectiveness of the ZEV Pilot Program.
- Other airport sponsors would like to see FAA broaden the eligibility requirements for the vehicles. Some sponsors suggested allowing all airports to participate, rather than giving priority to airports in areas designated by EPA to be in nonattainment of air quality standards. Section 511 of the Act states that participation by airport sponsors located in attainment areas is allowable only if there is a shortage of applicants from nonattainment areas. In the Technical Guidance document developed by FAA, priority for funding is given first to airport sponsors in nonattainment areas, then to airport sponsors in maintenance areas, and finally to airport sponsors in attainment areas. The FAA believes this cascade reflects the will of Congress to provide funding to airport sponsors in the worst air quality areas first. At the time of this report, FAA has not received any applications for funding from airport sponsors located in attainment areas. Regardless of the FAA’s priority, any interested airport sponsor can implement an independent ZEV program with local funds, and many airports are doing just that.

A small number of airport sponsors have informally communicated with FAA regarding their intention to submit a future ZEV grant application, although only one eligible grant application was received in FY 2013 and FY 2014.

Although fuel cell vehicles are eligible under the ZEV Pilot Program, FAA is not aware of any pending grant applications for any fuel cell vehicle; this may be due to limited fueling infrastructure and lack of commercially available vehicles. Several automobile manufacturers have developed fuel cell prototype and demonstration vehicles, but these are not yet available for purchase. However, some automobile manufacturers have announced plans to have

commercially available fuel cell vehicles available as early as 2014. Others have stated 2020 as a more realistic goal. We are not aware of any commercially available fuel cell vehicles as of the date when we updated this report.

3.0 COST-EFFECTIVENESS

Cost-effectiveness is defined by the statute as the amount of emissions reduced per dollar of funds expended. The FAA developed a methodology for use in estimating emission reductions and determining cost-effectiveness of ZEV Pilot Program projects. The intent of this methodology is to limit the amount of technical assistance needed to complete the ZEV Pilot Program application and therefore reduce overall costs.

The emission reduction assessment involves a step-by-step progression that starts with the baseline condition. The assessment compares the emission reductions associated with procurement of a ZEV rather than a conventionally fueled vehicle. The proposed ZEV is assumed to have zero emissions of criteria pollutants; therefore, the emission reductions are simply the total emissions calculated for the representative conventionally fueled vehicle over the life of the project. (The “useful life” of the vehicle varies from 5 to 10 years, depending upon the type of ZEV, as set forth in the ZEV Pilot Program Technical Guidance document issued by FAA.)

The FAA uses estimates of the tons of ozone reduced over the useful life of the project as the basis for consistently measuring cost-effectiveness among projects. While ZEVs reduce other criteria pollutants as well, vehicles are one of the primary drivers of ozone nonattainment in the United States and anthropogenic ozone is a widespread criteria pollutant. Therefore, FAA chose to use ozone emission reductions as the evaluation metric for all projects. For example, an area may base its ZEV Pilot Program grant eligibility on its status as an EPA-designated nonattainment area for carbon monoxide, not ozone. However, FAA requires the airport sponsor to estimate only the ozone emission reductions for the project in the ZEV Pilot Program application rather than all of the criteria pollutants. Using ozone emissions as a metric for comparison allows FAA to compare projects in a meaningful way and simplifies the application process for the airport sponsor.

The cost-effectiveness of the ZEV Pilot Program is difficult to assess at this stage of implementation. Based on preliminary information received to date, the average cost to reduce one ton of ozone emissions will likely be between \$2.5 million and \$10 million when calculated over the life of the vehicle (i.e., summation of estimated ozone reductions over each year the vehicle is expected to remain in service at the airport). The life of the vehicle varies according to the vehicle type and is described in the ZEV Pilot Program Technical Guidance document issued in December 2012.

Based on our preliminary assessment, the cost appears to be relatively high compared to the benefits, primarily because the emissions standards for conventionally fueled vehicles have already been improved so much that the marginal benefit of going to ZEV is smaller than it would have been in the past. Based on the U.S. Environmental Protection Agency’s vehicle emissions standards and the U.S. Department of Transportation’s automotive fuel economy

standards, the allowable emissions are already decreasing in new vehicles with each model year, so that the net emissions reduction between conventionally fueled vehicles and comparable ZEVs is steadily decreasing. However, FAA believes there may still be some value in proceeding with the ZEV Pilot Program on a limited, exploratory basis to fully evaluate the potential, mainly because competitive market forces may help reduce the costs.

The relative simplicity of the ZEV Pilot Program Technical Guidance document has resulted, as intended, in lower administrative and support costs to the airport sponsor. Preliminary information indicates the average project formulation/technical assistance cost is only about \$1,600 per project. Project formulation was either done in-house by the airport sponsor or contracted to third-party engineering firms. Although 49 USC § 47136a(e)(2) allows sponsors to obtain technical assistance from University Transportation Centers, at the time of this report, FAA is not aware of any airport sponsor having done so.

4.0 FUTURE STEPS

In addition to the webinar and stakeholder outreach already conducted by FAA, the Agency will continue in its efforts to inform airport sponsors of the ZEV Pilot Program and the grant application process. Particularly, the Agency will inform the smaller commercial service airports that may require more assistance in application preparation. To meet this objective, FAA will make available a dedicated ZEV Web site, which will contain:

- grant application information;
- technical guidance;
- lessons learned;
- best practices; and
- any other information of interest to airport sponsors who may be initiating a ZEV program.

The FAA anticipates this information will facilitate airport sponsor's implementation of a ZEV program with or without Federal financial support.

The FAA will continue to work closely with airport sponsors in developing program applications in anticipation of issuing ZEV Pilot Program grant awards. Using the experience gained from FY 2013, the first year of ZEV Pilot Program implementation, FAA will evaluate any needed revisions to the existing Technical Guidance document and will formulate best practices, lessons learned, etc., to guide future ZEV Pilot Program applicants.

The FAA will publish a list of any ZEV Pilot Program grant recipients on its Web site, including project descriptions and contact information. This information will also be incorporated into public seminars and workshop sessions and will be shared with industry trade associations to educate airport sponsors about the opportunities and results as we learn more. It is expected that this information will provide ideas and support to interested airport sponsors. Additionally, the FAA program managers for the ZEV Pilot Program, airport sustainability projects, and other related initiatives will work cooperatively to cross-promote each area.

The FAA will also continue to monitor the availability of hydrogen-powered vehicles (and fuel cell vehicles) that can meet the AIP Buy American requirements.

Because only one ZEV Pilot Program project has been implemented to date, it is difficult to evaluate the ultimate effectiveness of the ZEV Pilot Program. The FAA issued the Program Guidance Letter and Technical Guidance document in December 2012, making FY 2013 the first year of the ZEV Pilot Program implementation. The FAA currently does not have enough data to conduct a comprehensive evaluation of the effectiveness of the ZEV Pilot Program.

The FAA will make available on its Web site a list of resources, best practices, contacts, etc., to keep all interested parties informed and to facilitate the ZEV Pilot Program application process for airport sponsors. In addition, FAA will include updated information on program effectiveness and resultant emission reductions in its annual AIP Report to Congress for the duration of the ZEV Pilot Program.