U.S. Department
of Transportation
**Federal Aviation
Administration**

Zero Emissions Vehicle Pilot Program Technical Guidance

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Office of Airports

Airport Planning and Programming

National Planning and Environmental Branch

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1.0 Legislative Authority

The FAA Modernization and Reform Act of 2012 (2012 Act) created a new section in Title 49, United States Code (U.S.C.) § 47136a, *Zero-Emission Airport Vehicles and Infrastructure*. The section establishes a pilot program that allows airport sponsors to use Airport Improvement Program (AIP) funds for the acquisition and operation of zero emissions vehicles (ZEV) at an airport, including the construction or modification of infrastructure to facilitate the delivery of fuel and services necessary for the use of such vehicles. Under the FAA Reauthorization Act of 2018 (2018 Act), this section was amended and renumbered to 49 U.S.C. § 47136. The 2018 Act made minor modifications to the ZEV program, including specifying off-airport use, requiring Federal testing of the vehicles, the ability to lease vehicles, and providing for flexible procurement.

2.0 References

As required in 49 U.S.C. § 47136(j)(3), the FAA defines a ZEV as either:

- A zero-emission vehicle as defined in Title 40, Code of Federal Regulations (CFR) § 88.102-94; or
- A vehicle that produces zero exhaust emissions of any criteria pollutant (or precursor pollutant) under any possible operational modes and conditions.

The referenced CFRs are found at the eCFR website, https://www.ecfr.gov/

3.0 Definitions

Table 1. Definitions

The following...	Means...
Zero Emissions Vehicle (ZEV)	Any light-duty vehicle, light-duty truck, or any heavy-duty vehicle conforming to the applicable Zero Emission Vehicle standard (40 CFR § 88.102-94) that produces zero exhaust emissions of any criteria pollutant (or precursor pollutant) under any and all possible operational modes and conditions (49 U.S.C. § 47136(j)(3)(B)). In most cases, this involves a vehicle that has an all-electric or hydrogen-powered drive train.
Light-duty vehicle	Per 40 CFR § 86.082-2, a passenger car or passenger car derivative capable of seating 12 passengers or less.

The following...	Means...
Light-duty truck	Per 40 CFR § 86.082-2, any motor vehicle rated at 8,500 pounds gross vehicle weight rating (GVWR) or less, has a vehicle curb weight of 6,000 pounds or less, and which has a basic vehicle frontal area of 45 square feet or less, which is: (1) Designed primarily for purposes of transportation of property or is a derivation of such a vehicle, or (2) Designed primarily for transportation of persons and has a capacity of more than 12 persons, or (3) Available with special features enabling off-street or off-highway operation and use.
Heavy-duty vehicle	Per 40 CFR § 86.082-2, any motor vehicle rated at more than 8,500 pounds GVWR or that has a vehicle curb weight of more than 6,000 pounds or that has a basic vehicle frontal area in excess of 45 square feet.

4.0 Vehicle Requirements

4.1 Eligible Vehicles

An eligible vehicle includes any on-road vehicle that does not emit any criteria pollutant (or precursor pollutant) under any possible operational modes and conditions. The vehicle must also be certified by the sponsor that the make, model, or type of vehicle has been tested by a Federal vehicle testing facility acceptable to the Secretary.

4.2 Airport-Dedicated Vehicles

ZEV Pilot Program funding is limited to vehicles that are owned or leased by the airport sponsor and used on-airport for airport purposes with some limited off-airport use. Therefore, all vehicles purchased or leased through the ZEV Pilot Program must be "airport-dedicated," meaning that they must be an integral part of the aeronautical, transportation, security, or maintenance services at the airport, or other essential airport need; used on a regular basis in normal operation of the airport; and stored and maintained within the airport boundary.

Off-airport use is restricted to the transport of employees and passengers to nearby facilities that are owned or controlled by the airport or which otherwise directly support the functions or services provided by the airport or to an intermodal surface transportation facility adjacent to the airport.

Table 2. Off Airport Vehicle Use

For the following off-airport use...	The use would be considered...
Driving the vehicle off-airport for required servicing	Acceptable
Driving the vehicle to attend an airport-related conference	Unacceptable
To specifically support aeronautical services, such as airport maintenance or airport security that requires driving the outside perimeter of the airport	Acceptable
Driving between two nearby airports owned by the sponsor to transport employees or supplies between the two airports	Acceptable
Driving to airport-related meetings (i.e., City Council meetings)	Acceptable if city owns the airport
Driving the vehicle for personal reasons	Unacceptable
As a loaner vehicle for airport tenants or users	Unacceptable

4.3 Vehicle Use

Sponsors must operate vehicles acquired under the ZEV Pilot Program at the same level of use estimated in the airport sponsor's application.

4.4 New Vehicles

Airport sponsors must purchase or lease new vehicles under the ZEV Pilot Program. The ZEV Program is limited to costs for vehicle acquisition and related improvements and accessories to the vehicle that are normally eligible under the AIP for operation on the airport. For example, the airport sponsor can include in the grant application costs to add a radio for communications with the Airport Traffic Control Tower when the vehicle is planned for use in the Aircraft Operations Area. Likewise, costs for specialized lighting on the vehicle are also eligible. However, costs to retrofit the vehicle for a specific airport purpose are not eligible. This would include modifications to the vehicle to include specialized equipment, storage boxes, etc. The airport sponsor must exclude these costs from the ZEV Pilot Program application.

4.5 Other Costs Associated with Vehicles

Program eligibility for all vehicles is limited to capital improvement costs and does not extend to operational or maintenance costs, including fuel.

4.6 Ownership Requirements

Requirements for ownership of ZEV vehicles and equipment: Sponsors must.

- Own or lease all new or retrofitted vehicles and equipment purchased through the ZEV Pilot Program.
- Not use ZEV Pilot Program funding for tenant-owned vehicles or equipment (e.g., airline vehicles).
- Not lease ZEV vehicles and equipment purchased under the ZEV Pilot Program to airport tenants.
- Not sell or transfer title to program vehicles during the useful life of the vehicle without prior notification and written approval by the FAA.

4.7 Useful Life for Typical Airport Vehicles

Table 3 provides average useful life data for the three major vehicles categories eligible under the ZEV Pilot Program. The airport sponsor must use these useful life assumptions to calculate project emission reduction. Because airport-dedicated vehicles operate primarily on airport property, their useful lives can differ from the typical life spans of the same vehicles when used off-airport. The following useful life estimates for common airport vehicle types are based on FAA project experience through implementation of the Voluntary Airport Low Emissions (VALE) Program. Other useful life data can be found in the VALE Technical Guide, which is found on the VALE website at: https://www.faa.gov/airports/environmental/vale/.

Table 3. Useful Life

Category and Vehicle Type	Average Useful Live (yrs.)
Light Duty Vehicles: Cars/vans	10
Light Duty Trucks: Pickup trucks	10
Light Duty Trucks: Flatbed/large trucks	12
Heavy Duty Vehicles: 19-35 foot buses	10
Heavy Duty Vehicles: 40+ foot buses	10
Ground Service Equipment	Varies (See VALE Technical Guide, Chapter 4)

4.8 Buy American

All vehicles and their power-sources purchased under the ZEV Pilot Program must meet Buy American requirements. Each application must include information on how the proposed ZEV complies with Buy American requirements. Buy American requirements for AIP are posted at: http://www.faa.gov/airports/aip/buy_american/. Vehicle purchases can be separated from power-source purchases if Buy American requirements cannot be met with joint purchasing. For example, a sponsor can purchase or lease the vehicle with ZEV funding and then purchase or lease the power-source on their own if the power-source would preclude meeting the Buy American waiver limits.

4.9 Commercial Availability

More and more manufacturers currently produce ZEVs. The California Air Resources Board list of vehicles that currently meet the ZEV standard can be found at www.driveclean.ca.gov. This list does not address Buy American requirements.

4.10 Excluded Vehicles

Vehicles that are excluded from the ZEV Pilot Program:

- Partial ZEVs or vehicles utilizing "hybrid" technologies are not considered a ZEV and are not eligible under the ZEV Pilot Program.
- Vehicles that are not owned/leased and operated by the airport sponsor.
- Vehicles that are not "on-road" eligible (off-road vehicles).

5.0 Refueling and Recharging Stations

As specified in 49 U.S.C. § 47136(a)(2), the construction or modification of infrastructure to facilitate the delivery of fuel, power, and services for project ZEVs is eligible. The FAA defines eligible infrastructure as including refueling stations, rechargers, on-site fuel storage tanks, and other equipment needed for station operation. The sponsor must limit the capacity of refueling and recharging stations to the number of project vehicles and their fueling requirements. For instance, the number of project rechargers should equal one port per ZEV project vehicle with reasonable allowances for the efficient management of peak operations. Eligible costs do not include major upgrades to airport fuel storage systems, electrical substations, and trunk lines. In addition, installation costs for refueling and recharging stations and related equipment are limited to the lowest-cost alternative for installation as demonstrated by the airport sponsor through a comparative value-engineering analysis when requested by the FAA.

5.1 Public Access to Refueling and Recharging Stations

Another consideration in capacity sizing is public access, which the sponsor may grant for hydrogen refueling stations and electric recharging stations under certain conditions. The requirements for public access are below.

- 90 percent of the funded refueling or recharging station capacity is dedicated for on-airport vehicle use. Therefore, only 10 percent of the funded refueling or recharging station capacity can be dedicated to public use.
- The sponsor must guarantee security and public safety.
- The sponsor must charge a reasonable fee for the use of the facility.
- Sponsor vehicles must have priority use of the facility, especially in the event of fuel shortages or emergencies.
- The sponsor must clearly document the number of project ZEVs and public ZEVs that will access the facility.
- Sponsors must provide letters of commitment to the FAA from non-airport ZEV owners at the time of grant application to support their proposed facility use plans.

6.0 Eligible Airports

Any public-use airport eligible to receive AIP grants in the National Plan of Integrated Airport Systems is eligible for a ZEV grant.

7.0 Selection Criteria

The 2018 Act set the priority consideration to applicants that will achieve the greatest air quality benefits measured by the amount of emissions reduced per dollar of funds expended under the program. While this does not specifically mention areas of non-attainment or maintenance, some additional consideration is given to these areas since any improvement in such areas will have an added benefit of bringing the area into compliance.

8.0 Application Requirements

The airport sponsor must include the completed spreadsheet in Attachment A with a completed ZEV application. The application must include a figure or figures showing where infrastructure will be installed and the routing of any vehicles, if relevant. Some vehicles such as maintenance vehicles will have no specific routes. An SF 424, *Application for Federal Assistance*, must also be submitted to receive consideration for funding under the ZEV Pilot Program.

8.1 Testing Required

A sponsor of a public-use airport may not use funds made available under the program to acquire a zero-emission vehicle unless that make, model, or type of vehicle has been tested by a Federal vehicle testing facility acceptable to the Secretary. The airport sponsor can submit a certification of compliance to meet the testing facility requirement.

8.2 Federal Share

The Federal share of any ZEV Pilot Program project shall be the Federal share specified in 49 U.S.C. § 47109.

9.0 Technical Assistance and Project Management

9.1 Limits on Technical Assistance and Project Management Costs

Per 49 U.S.C. § 47136(e)(1), the cost of technical assistance and project management in an application is limited to a maximum of 10 percent of the total ZEV vehicle purchase or lease price. Technical assistance includes any professional services for preparation of the ZEV Pilot Program application and other project formulation costs sought by the sponsor. Project management includes support to assist the airport with the solicitation, acquisition, and deployment of zero-emission vehicles, related equipment, and supporting infrastructure.

9.2 Use of University Transportation Centers

Airport sponsors can obtain technical assistance or project management support from University Transportation Centers receiving grants under 49 U.S.C. § 5506, *University Transportation Research*. Per 49 U.S.C. § 47136(e)(2), the University Transportation Center must be located in the region where the airport is located. For purposes of this pilot program, the FAA defines this as the University Transportation Center located closest to the airport.

Sponsors must 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 by the University Transportation Center.

Policies and procedures for procurement of professional services applicable to the U.S. Department of Transportation are established in Federal Regulation at 2 CFR parts 1200 and 1201, *Federal Agency Regulations for Grants and Agreements*. FAA Advisory Circular 150/5100-14, *Architectural, Engineering, and Planning Consultant Services for Airport Grant Projects,* serves as the official FAA guidance for sponsors to assure conformance with 2 CFR part 200.

9.3 Use of Nonprofit Organizations

Sponsors may also seek project management support from a nonprofit organization selected by the Secretary of Transportation, a duty that is delegated to FAA under 49 CFR §1.83. If a sponsor is using a nonprofit organization, the sponsor shall submit the sponsor's name and contact information as well as proof of nonprofit status in accordance with 34 CFR § 75.51.

10.0 Emissions Reduction Estimates and Cost Effectiveness

As discussed in Section 7, Selection Criteria, the FAA will give funding priority to applications that demonstrate the greatest air quality benefits measured by the amount of emissions reduced per dollar of funds expended (referred to as the project's cost effectiveness) through the ZEV Pilot Program. The airport sponsor must use the methodology discussed in this section to estimate the reduction in emissions as a result of project implementation and for calculating the project's cost effectiveness.

The emissions reduction assessment process involves a step-by-step progression that accounts for the assumed baseline condition which is normally a conventionally-fueled vehicle comparable to the proposed ZEV. In all cases, the proposed ZEV is assumed to have zero criteria pollutants, therefore, the emissions reductions are simply the total emissions calculated for the representative conventionally fueled vehicle over the useful life of the project. The FAA has developed a methodology to quickly estimate air quality emissions reductions in this program. This is intended to limit the amount of technical assistance needed to complete the ZEV Pilot Program application and reduce overall program costs.

In implementing the ZEV Pilot Program, the FAA will use an estimate of tons of Ozone (O_3) reduced over the useful life of the project as the basis for consistently measuring cost effectiveness. While ZEVs reduce other criteria pollutants, conventionally-fueled vehicles are one of the primary drivers of Ozone nonattainment in the United States. To calculate Ozone reduced, the airport sponsor will sum the total tons of Nitrogen Oxides (NOx) and Volatile Organic Compounds reduced for the useful life of the project. Refer to the calculation methodology included on the application in Attachment A.

11.0 Flexible Procurement Procedures

A sponsor of a public-use airport may use funds made available under the program to acquire, by purchase or lease, a zero-emission vehicle and a removable power source in separate transactions, including transactions by which the airport purchases the vehicle and leases the removable power source. Furthermore, a sponsor can apply just for the vehicle and pay separately for the power source in order to comply with the Buy American requirements. Often a vehicle will meet the Buy American waiver alone but will not pass the 60% waiver requirement with the battery. In these cases, the sponsor can apply only for the vehicle and receive funds for said vehicle if the sponsor also

agrees to purchase, at their own cost, the power supply. Sponsors must guarantee that the power source will be maintained for the expected lifespan of the vehicle.

Attachment A.
Application and Emissions Reduction Worksheets

Download the worksheet at the FAA ZEV website:
https://www.faa.gov/airports/environmental/zero_emissions_vehicles/

Sample images of a blank worksheet appear on the next two pages.

Zero Emission Vehicle Program Worksheet

Airport Name:			
Airport Sponsor Name:			
Three Letter Airport ID:		Date of Submission:	
Contact Person:			
Contact Phone Number:		email:	

Intended Use for the Vehicle Described Below:

What is the air quality status at the Airport? Use the Drop down menu.		
Ozone (O_3) 8-hour standard		Nonattainment
		Maintenance
		Attainment
Particulate Matter - PM_{10}		Nonattainment
		Maintenance
		Attainment
Particulate Matter - $PM_{2.5}$		Nonattainment
		Maintenance
		Attainment
Carbon Monoxide - CO		Nonattainment
		Maintenance
		Attainment
Nitrogen Dioxide - NO_2		Nonattainment
		Maintenance
		Attainment
Sulfur Dioxide - SO_2		Nonattainment
		Maintenance
		Attainment

Proposed Zero Emissions Vehicle Identification	
Vehicle Year:	
Vehicle Make:	
Vehicle Model:	

Vehicle Cost Calculation	
Number of Vehicles Purchased:	
Cost Per Vehicle:	
Federal AIP Match %:	

Vehicle Charger Information	
# of fuel Stations or Chargers Purchased:	
Refueling Station or Charger Cost:	
Insatallation Cost/Charger or Fuel Station:	

Technical Assistance, Design Fees and Project Formulation (not to exceed 10% of Project Costs)	

Project Item:	AIP Funding Share	Matching Sponsor Share	Total Item Cost
Vehicles:	$0.00	$0.00	$0.00
Charging Equipment:	$0.00	$0.00	$0.00
Charging Installation:	$0.00	$0.00	$0.00
Tech Assist, Design Fees & Formulation:	$0.00	$0.00	$0.00
Total Project Costs:	$0.00	$0.00	$0.00

Vehicle Emissions Calculations

Gross Vehicle Weight Rating in lbs.:	
Your Vehicle is classified as a:	
If your vehicle is described as a "Heavy Duty Vehicle" use the drop-down list to indicate the type of engine that would have been purchased if this vehicle was not Zero Emissions. Otherwise leave blank	
What is the average mileage each vehicle will accrue in any one year?	
Source of the mileage data?	
Average Useful Lifespan of vehicle (normally 10 years, use AIP Handbook)	

Step 1: Total mileage for purchased vehicles **(Number of vehicles purchased * Average Annual Mileage)**	**0**
Step 2: Annual Grams of NOx Reduction **(Step 1 * the NOx grams/mile for vehicle type)**	-
Step 3: Convert to Annual Pounds of NOx Reduction (Result of Step 2 x 0.0022)	-
Step 4: Calculate Pounds of NOx Reduction over Vehicle Useful Life (Result of Step 3 x Useful Life)	-
Step 5: Convert to Tons of NOx Reduction over Vehicle Useful Life (Result of Step 4 divided by 2,000)	-
Step 6: Calculate Annual Grams of VOC Reduction **(Step 1 * the VOC grams/mile for vehicle type)**	-
Step 7: Convert to Annual Pounds of VOC Reduction (Result of Step 6 x 0.0022)	-
Step 8: Calculate Pounds of VOC Reduction over Vehicle Useful Life (Result of Step 7 x Useful Life)	-
Step 9: Convert to Tons of VOC Reduction over Vehicle Useful Life (Result of Step 8 divided by 2,000)	-
Total NOx and VOC Reduction (Sum Step 5 and Step 9)	-

Project Cost Effectiveness Calculation

Pollutant	Total Project Cost (C)	Total Amount of Emissions Reduction (Tons)	Cost Effectiveness Over Useful Life of Project ($/ton)
Ozone (Nox + VOC)	$0.00	0.0000	#DIV/0!