U.S. Department of Transportation
Federal Aviation Administration

VOLUNTARY AIRPORT LOW EMISSION PROGRAM

TECHNICAL REPORT

Version 7

Office of Airports
Airport Planning and Programming

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VERSION CHANGES

This version (Version 7) of the Technical Report should be used for VALE applications in FY 2011 and in subsequent years until the next published update of the guidance.

Below is a list of important Version 7 additions to the Technical Report:

1. Revised low-emission standards for heavy-duty on-road vehicles acquired through the VALE program. (Chapter 5)

2. New guidance on the emission assessment procedures for gate electrification projects involving gate power and preconditioned air. Gate electrification projects are the among the most popular and cost effective airport low-emission strategies, with direct cost savings to the airlines. Sponsors are provided with detailed instructions for making baseline vs. project comparisons. (Chapter 9)

3. Updated cost effectiveness ranges based on six years of VALE project experience and information obtained through the required competitive bidding process. The cost effectiveness ranges are an important factor in prioritizing VALE projects. The higher ranges were influenced by the trend toward cleaner and more fuel efficient vehicles and the costs of supporting infrastructure. (Chapter 9)

4. Enhancements to the FAA Emissions and Dispersion Modeling System (EDMS) to improve the reporting of project emission calculations for VALE proposals and airport emission reduction credits. (Chapter 9)

5. Additional statutory support for VALE airport emission reduction credit methodology through EPA April 2010 revisions to the Clean Air Act/General Conformity Rule.

ACRONYMS AND ABBREVIATIONS

ADO	Airports District Office
AEE	FAA Office of Environment and Energy
AERC	Airport emission reduction credit
AERC Report	*Guidance on Airport Emission Reduction Credits for Early Measures through Voluntary Airport Low Emission Programs,* developed by EPA and FAA
AERCPP	Airport Emission Reduction Credit Post Processor
AFV	Alternative fuel vehicle
AIP	Airport Improvement Program
APP	Airport Planning and Programming
APU	Auxiliary power unit
AQ	Air quality
bhp	Brake horse power
CAA	Clean Air Act, including all subsequent amendments
CARB	California Air Resources Board
CI	Compression-ignition or -ignited
CNG	Compressed natural gas
DOE	United States Department of Energy
DOT	United States Department of Transportation
EDMS	FAA's Emissions and Dispersion Modeling System
EIS	Environmental Impact Statement
EPA	United States Environmental Protection Agency
EPAct	DOE Energy Policy Act of 1992
EV	Electric vehicle
FAA	Federal Aviation Administration
FBO	Fixed based operator
FCV	Fuel cell vehicle
FFV	Flexible-fuel vehicle
GAO	United States General Accounting Office
GAV	Ground access vehicle
GSE	Ground support equipment
GVWR	Gross vehicle weight rating
HDDV	Heavy duty diesel vehicle
HDV	Heavy duty vehicle
hp	Horse power
Hz	Hertz
ICAO	International Civil Aviation Organization
ICE	Internal combustion engine
ILEAV	Inherently Low Emission Airport Vehicle pilot program
LDT	Light duty truck
LDV	Light duty vehicle
LEV	Low emission vehicle

LNG	Liquefied natural gas
LPG	Liquefied petroleum gas
MDPV	Medium duty passenger vehicle
MOBILE6	EPA standard model for on-road vehicle emission factors
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act of 1969
NGV	Natural gas vehicle
NMHC	Non-methane hydrocarbons
NMOG	Non-methane organic gases
NON-ROAD	EPA's off-road vehicle emissions model
NPIAS	National Plan of Integrated Airport Systems
NSR	New source review
O&M	Operations and maintenance
OEM	Original equipment manufacturer
PC	Passenger car
PCA	Preconditioned air (unit)
PFC	Passenger Facility Charge
PM	Particulate matter
ppm	Parts per million
psi	Pounds per square inch
R&D	Research and development
RUL	Remaining useful life
SI	Spark-ignition or ignited
SIP	State Implementation Plan
SULEV	Super ultra low emission vehicle
TAF	FAA's *Terminal Area Forecast*
tpy	Tons per year
ULEV	Ultra low emission vehicle
ULSD	Ultra low sulfur diesel
USAF	United States Air Force
USC	United States Code
VALE	Voluntary Airport Low Emission program
VOC	Volatile organic compound
Vision 100	Vision 100 – Century of Aviation Reauthorization Act (Public Law 108-176)

CHAPTER 1
INTRODUCTION

The Voluntary Airport Low Emission Program (VALE) is described in this chapter, including VALE program benefits, airport eligibility, agency and industry participants, applicable environmental regulations, and associated Federal Aviation Administration (FAA) programs.

1.1 Program Description

The Vision 100—Century of Aviation Reauthorization Act (Vision 100), signed into law in December 2003,[1] established a voluntary program to reduce airport ground emissions at commercial service airports in air quality nonattainment and maintenance areas.[2] The program is intended to help airport sponsors meet their obligations under the Clean Air Act and to assist regional efforts to meet health-based National Ambient Air Quality Standards (NAAQS).

Vision 100 directs the FAA to issue this technical guidance report describing eligible airport low-emission activities and how airport sponsors (hereafter referred to as the "sponsor")[3] should demonstrate program benefits. Developed in consultation with the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Energy (DOE), this guidance discusses program eligibility for converting vehicles to alternative and clean conventional fuels and for implementing low-emission infrastructure improvements.

To administer the Vision 100 airport emission provisions, the FAA created the VALE program in 2005. Participation in the VALE program is entirely voluntary for sponsors and State air quality agencies.[4]

The goal of the VALE program is to help airport sponsors improve air quality in conjunction with regional efforts to meet health-based National Ambient Air Quality Standards.

[1] Public Law 108-176, Subtitle B-Passenger Facility Fees, Section 121 (Low-Emission Airport Vehicles and Ground Support Equipment); Subtitle C-AIP Modifications: Section 151 (Increase in Apportionment for, and Flexibility of, Noise Compatibility Planning Programs), Section 158 (Emission Credits for Air Quality Projects), and Section 159 (Low-emission Airport Vehicles and Infrastructure).
[2] 49 U.S.C. §§ 40117, 47139 and 47140.
[3] Airport "sponsors" are planning agencies, public agencies, or private airport owners/operators that have the legal and financial ability to carry out the requirements of the AIP program. The term is also used in this document to refer to the PFC program, which is restricted to "public agencies."
[4] Includes delegated district, local, and Tribal air quality agencies.

The goal of the VALE program is to reduce the amount of regulated pollutants and other harmful air emissions generated by ground transportation sources at airports. To achieve this goal, the program provides sponsors with financial and regulatory incentives to increase their investments in proven low-emission technology. The program also supports U.S. energy independence by emphasizing domestically produced alternative fuels that are substantially non-petroleum based. Thus, sponsors are encouraged to purchase alternative fuel vehicles (AFVs) and equipment that are suited to the airport environment.

Funding for the VALE program is provided through two airport assistance programs, the FAA Airport Improvement Program (AIP), which provides grants to airports from the Aviation Trust Fund, and the Passenger Facility Charges (PFC) program, which approves locally imposed fees from airline passengers for eligible airport development. These programs offer substantial resources to airports for low-emission activities but only if such activities represent a higher priority for the airport than other needed airport development.

The VALE program also provides an important regulatory incentive to complement FAA capital investments. In accordance with Vision 100, the EPA issued national guidance in September 2004 on how airports can receive airport emission reduction credits (AERCs) for VALE projects and apply those credits to future airport projects to meet certain CAA requirements. This EPA guidance was developed in consultation with the FAA and is provided to airport sponsors and States in the document, "*Guidance on Airport Emission Reduction Credits for Early Measures Through Voluntary Airport Low Emission Programs*" (hereafter referred to as the "AERC Report"). Under Vision 100, the FAA may not approve AIP or PFC funding for VALE projects without a State AERC Letter of Assurance[5] that commits to granting appropriate AERCs to the sponsor.

The eligibility guidelines, requirements, and procedures for the VALE program are based on the Vision 100 enabling legislation, the Clean Air Act, and established AIP and PFC program regulations. As with other eligible airport activities, the VALE program is focused on capital improvement projects and the deployment of proven, cost effective technology that is commercially available and no longer in the research and development (R&D) stage.

1.2 Growing Airport Air Quality Responsibilities

Air quality has emerged as an important environmental issue for transportation and aviation planning in the U.S. and around the world. The FAA and the airport community recognize that controlling airport emissions and meeting Federal and State air quality requirements are essential to the continued growth and improvement of public aviation. Aviation continues to be a fast growing sector of the national transportation system and a vital link in the national economy. The civil aviation sector provides 11 million jobs and

[5] The recommended AERC Letter of Assurance is provided in Appendix G.

represents over one *trillion* dollars of economic activity, or about 10 percent of the U.S. gross domestic product.[6]

The aviation community is making substantial headway in addressing national air quality concerns through efforts like the VALE program, despite the fact that airports are a relatively small source of overall regional emissions. The combined emissions from aircraft and ground support equipment (GSE) typically represent approximately 3 to 5 percent of emissions regulated under State Implementation Plans (SIP) nationwide, compared to other surface transportation sources (40 to 60 percent), and other point and area sources (another 40 to 60 percent). Despite aviation's relative influence on air quality, the aviation community knows that improving air quality is a regional problem that requires a collaborative effort by the States, industry, vehicle manufacturers, and transportation agencies.

1.3 Benefits of the VALE Program

The voluntary VALE program provides opportunities for all participants. Sponsors, the FAA, and State air quality agencies benefit from the program's focus on early and accelerated airport emission reductions. For airports, which are changing and responding to a dynamic aviation industry, the VALE program offers increased financial and regulatory support as sponsor's plan for the future and seek to balance growing public demand for airport services with environmental protection.

Sponsors have the opportunity to obtain AIP and PFC funding through the VALE program to achieve earlier and larger emission reductions. The program also provides useful airport planning tools to reduce uncertainty. For example, VALE-generated AERCs can be used on future airport development projects to satisfy general conformity and new source review (NSR) requirements under the CAA. Specifically, a sponsor can apply AERCs to an airport terminal or runway project as "design measures" to keep project emissions below general conformity *de minimis* levels and thereby avoid a general conformity determination (see Chapter 9).

States have the opportunity to realize the environmental and public benefits of early reductions in airport emissions in exchange for granting AERCs to airport sponsors. Further, the VALE program helps all parties and the environment by:

- Facilitating dialog between airport sponsors and air quality agencies
- Expediting the environmental review process for airport projects
- Encouraging better identification and control of airport emission sources

In addition to environmental benefits, the VALE program may also lead to economic benefits for airports. Current evidence suggests that cleaner-burning alternative fuels and

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[6] DOT Future of Aviation Advisory Committee (FAAC) Sustainable Alternative Fuels Briefing Paper, August 2010; DRI-WEFA, Inc., in collaboration with the Campbell-Hill Aviation Group, Inc., *The National Economic Impact of Civil Aviation*, July 2002.

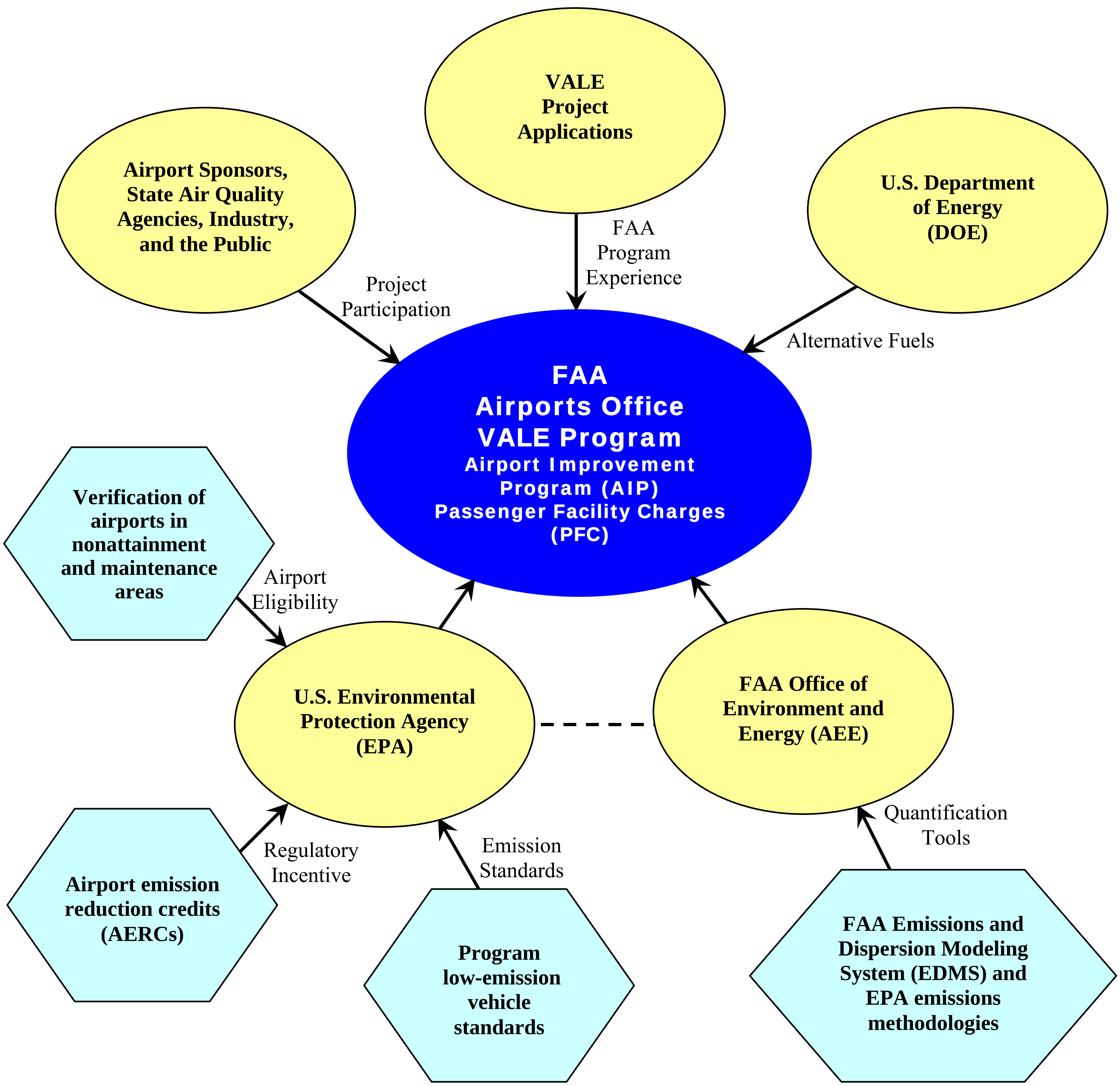
AFVs are effective life-cycle investments. The higher capital costs to purchase AFVs are generally offset in a few years by their lower operations and maintenance (O&M) costs. The prevailing view is that the AFV market is constrained primarily by the lack of refueling infrastructure – a need that is addressed by the VALE program.

1.4 Agency and Industry Coordination

The FAA consulted with many agencies and organizations in the process of developing the VALE program (see **Figure 1-1**). The DOE Clean Cities Program provided information on alternative fuels and fuel station requirements. The EPA provided essential support in several areas: a) identification of airports in nonattainment or maintenance areas; b) vehicle low-emission standards; and c) AERC guidance. These agencies have an ongoing role in helping the FAA to manage the VALE program and to maintain the program low-emission standards.

In addition, numerous aviation and fuel industry associations provided technical suggestions, many of which were incorporated into this guidance. The FAA also relied on State air quality agencies, original equipment manufacturers (OEMs), energy companies, and environmental organizations to help achieve a realistic balance between forward-looking emission standards and the commercial availability of cost effective low-emission technology.

Figure 1-1. Illustration of Coordinated Effort for the VALE Program



1.5 National Environmental Policy Act and Clean Air Act Considerations

Two major Federal environmental regulations are associated with airport air quality concerns – the National Environmental Policy Act of 1969 (NEPA) and the Clean Air Act and its Amendments (CAA). NEPA ensures that Federal actions are considered carefully for their potential environmental effects and gives citizens and public officials an opportunity to comment on proposed projects before Federal decisions are made and projects begin. To meet its NEPA responsibilities, the FAA has issued agency procedures for NEPA implementation under *Order 1050.1E, Environmental Impact: Policies and Procedures*.[7] This FAA Order describes how the agency adheres to environmental laws and addresses specific impact areas, including noise, air and water quality, wetlands, wildlife protection, and historic preservation.

Given the potential for VALE projects to permanently improve air quality, environmental review of VALE projects is expected to be routine. Under general conformity, VALE projects are "presumed to conform" and are therefore exempt from further conformity evaluation.[8] Under NEPA, VALE projects are considered to be separate Federal actions with "independent utility" and may be approved without regard to other airport development projects. Many types of VALE projects can be "categorically excluded" if there are no "extraordinary circumstances" associated with the project.[9]
Voluntary emission reductions through the VALE program must be above and beyond the existing mitigation commitments made by airport sponsors in environmental documents for NEPA, CAA, or agency agreements. For example, if the sponsor has completed an Environmental Impact Statement (EIS) and the FAA Record of Decision has been signed with air quality commitments, the VALE program cannot be used to fund these requirements because it is a voluntary program for additional or surplus reductions.[10]

Under the specific mandates of the CAA, airport development is primarily subject to two air quality regulations: general conformity and NSR. The conformity provisions protect the public health by ensuring that airport development plans do not interfere with the State's ability to bring designated nonattainment areas into full attainment with the NAAQS. Airports can be located in nonattainment or maintenance areas for one or more of the six criteria pollutants listed below.

- Ground level ozone (O_3)
- Carbon monoxide (CO)
- Particulate matter (PM_{10} and $PM_{2.5}$)
- Nitrogen dioxide (NO_2)
- Sulfur dioxide (SO_2)

[7] Federal Register. Volume 69, No. 115, pp. 33778-33822. June 16, 2004.
[8] *Federal Presumed to Conform Actions Under General Conformity*, Federal Register Notice, July 30, 2007, Vol. 72, No. 145, pp. 41565-41580.
[9] FAA Order 5050.4B, Table 6-2.
[10] Apart from the VALE program, documented environmental mitigation requirements may be eligible for AIP or PFC funding (see Chapter 7 and AIP Handbook, Order 5100.38C, Section 585).

- Lead (Pb)

For the purposes of the VALE program, "Level One" pollutants are the criteria pollutant(s) or designated precursors that cause the nonattainment or maintenance status of the region surrounding the airport. "Level Two" pollutants are the remaining criteria pollutants that do not contribute to an area's nonattainment or maintenance status.

A description of each criteria pollutant is provided in the glossary in **Appendix A**. Little to no lead (Pb) in the conventional and alternative fuels used at commercial service airports makes the evaluation of Pb emissions unnecessary for this program.

The focus of general conformity regulations and the VALE program is on local air quality and criteria pollutants. However, consequential reductions in greenhouse gas emissions achieved through implementation of VALE projects will also help to mitigate global climate change.

1.6 Airport Eligibility

To be eligible for the VALE program, an airport must be a commercial service airport listed in the FAA's National Plan of Integrated Airport Systems (NPIAS) and located in an EPA-designated nonattainment or maintenance area for one or more of the criteria pollutants listed above.[11] The FAA, in cooperation with the EPA, prepared a list of eligible airports, which is available on the FAA VALE website.[12] Sponsors are encouraged to contact their State air quality agency for further information or verification of their nonattainment or maintenance status.

Approximately one-third of U.S. commercial service airports, including many of the nation's largest and busiest, are located in EPA-designated nonattainment or maintenance areas. Recent changes to the NAAQS have increased the number of airports in nonattainment areas. Consequently, more sponsors must perform detailed conformity evaluations and plan for the possibility of emission reduction measures.

Airports are naturally suited to manage emissions from stationary and ground transportation sources because of their centralized operations and design. Airport fleets, especially GSE, operate primarily, if not exclusively, on airport property. In addition, vehicle refueling and recharging stations can often be sited safely and conveniently at airports. On the other hand, sponsors have little ability or authority to control aircraft emissions. U.S. aircraft emission standards are established by the EPA within an international framework administered by the International Civil Aviation Organization (ICAO). In addition, aircraft and engine manufacturers require long lead-times to design new aircraft engines and must consider numerous factors, including aircraft safety, performance, fuel efficiency, noise, and cost.

[11] 49 U.S.C. §§ 40117, 47139, and 47140.
[12] http://www.faa.gov/airports/environmental/vale.

1.7 Associated FAA Programs

The VALE program expands the traditional eligibility of low-emission airport technology under the AIP and PFC programs, for instance, by increasing eligibility for mobile emission sources.

It is important to note that project eligibility varies between the two FAA airport funding programs in several important respects. Sponsors should consider these funding distinctions in planning their VALE projects and in selecting the most appropriate funding source or combination of sources to support them (see Chapter 7 on AIP and PFC project eligibility requirements).

1.7.1 Airport Improvement Program

As authorized by Title 49 U.S.C. Chapter 471 as amended and Public Law 103-272, the objective of the AIP is to assist sponsors, owners, or operators of public-use airports in developing a nationwide system of airports adequate to meet the needs of civil aeronautics. The forms of assistance to airport sponsors are primarily monetary grants, and may also include advisory services and counseling. AIP grants are made to eligible sponsors for airport planning and development, which includes activities to construct new public airports; improve and rehabilitate infrastructure; extend runways; purchase firefighting, rescue, security, and snow removal equipment; and install navigation aids. Environmental activities under the AIP include the preparation of environmental documents and coordination with local and regional authorities on land use planning.

Regulations, guidelines, and literature governing the use of AIP grants are provided in FAA Orders and Advisory Circulars (FAA Order 5100.38C, Airport Improvement Program Handbook as amended, and FAA Advisory Circulars in the 150/5100 series). More information on the AIP is available through the FAA website: www.faa.gov/.

1.7.2 Passenger Facility Charges Program

The PFC program is authorized by 49 U.S.C. Subtitle VII, Part A – "Air Commerce and Safety", Section 40117. This statute was implemented by the Aviation Safety and Capacity Expansion Act of 1990, which amended the Federal Aviation Act of 1958, to remove the restriction against imposition of a PFC. The statute authorizes the Secretary of Transportation to allow a public agency that controls at least one commercial service airport to impose a fee for each paying air carrier passenger enplaned at the airport. This revenue finances PFC program eligible airport projects to be carried out at the commercial service airport or any other airport that the public agency controls.

The FAA may grant authority to impose a PFC only if the FAA finds, on the basis of an application submitted by the public agency, that the amount and duration of the PFC collection will not result in excess revenues and the proposed project(s) is: eligible; meets at least one PFC objective or significant contribution finding; and is adequately justified. Air carriers and their agents are required to collect PFCs imposed by public agencies and must remit those charges, less an FAA-authorized administrative fee, in a timely manner. In addition, the PFCs collected by the carrier must be noted on the passenger's ticket. More information about the PFC program is available through the FAA website: www.faa.gov/.

1.7.3 Inherently Low Emission Airport Vehicle (ILEAV) Pilot Program

The ILEAV pilot program preceded the VALE program and provided a model for design and development of the VALE program. Authorized under the Wendell H. Ford Aviation Investment and Reform Act for the 21st Century (*AIR-21*), the ILEAV pilot program operated from 2001 to 2005. Ten public use airports were awarded individual grants of up to $2 million to demonstrate the benefits and economic feasibility of low-emission vehicles and supporting infrastructure.

Participating sponsors used ILEAV grants to purchase and evaluate mobile and stationary low-emission technologies that are applicable to the airport environment. The pilot projects also provided useful information about the environmental and economic trade-offs of alternative fuels, their safe handling, and the commercial availability of low-emission technology.

The emission reductions that continue to be achieved by ILEAV pilot projects are eligible for AERCs provided through the VALE program. ILEAV pilot projects are the only prior airport activities that qualify for VALE AERC consideration.

1.7.4 FAA Emissions and Dispersion Modeling System

The FAA Office of Environment and Energy (AEE) develops and maintains the Emissions and Dispersion Modeling System (EDMS). The FAA created EDMS in the mid-1980s in cooperation with the United States Air Force. The model has become increasingly sophisticated over time and offers the ability to perform emission inventories and dispersion analyses for all of the major emission sources in the airport environment. These sources include aircraft engines, auxiliary power units (APUs), GSE, ground access vehicles, training fires, and stationary sources such as boilers and bulk liquid storage tanks.

EDMS is the FAA required model for assessing aviation emission sources at airports and is recognized by the EPA.[13] Under the VALE program, sponsors are required to begin their projects using the latest version of EDMS. The output reports from the model are an integral part of the initial VALE application and the sponsor's application for AERCs from the State air quality agency.

AEE continues to improve EDMS to meet evolving VALE program requirements for accurate quantification and reporting of project emission reduction benefits. More information about EDMS and the emissions assessment process is contained in Chapter 9.

1.8 Contents of this Report

The following chapters of this report explain the process, eligibility, and technical requirements of the VALE program. **Chapter 2** presents the application steps for sponsors to follow in applying for VALE program funds. **Chapter 3** addresses fuel eligibility requirements and offers information on the technical and emission trade-offs of alternative fuels. **Chapter 4** discusses general vehicle eligibility issues. **Chapter 5** presents the program low-emission standards that new vehicles must meet to be eligible for the VALE program. **Chapter 6** discusses the eligibility for infrastructure projects and fuel facility guidelines. **Chapter 7** describes the different eligibility requirements of the AIP and PFC programs. **Chapter 8** outlines airport program responsibilities and the special conditions for participation. And **Chapter 9** provides the required assessment methodology for emission reduction estimates, AERC use, and project cost effectiveness.

This report has eight appendices. **Appendix A** is the Glossary of Terms. **Appendix B** provides the sections of Vision 100 that apply to the VALE program. **Appendix C** lists the "special conditions" in the VALE program for AIP grants and PFC funding approvals. **Appendices D and E** offers sample worksheets for project applications and project tracking, respectively. **Appendix F** provides a project checklist for FAA personnel to use in reviewing VALE project applications. Finally, **Appendices G and H** contain examples of AERC documentation. Appendix G shows a recommended AERC Letter of Assurance from a State air quality agency to the FAA, and Appendix H provides an approved AERC Statement that a State air quality agency issued to a participating sponsor.

[13] U.S. Environmental Protection Agency, *Guidelines on Air Quality Models (Revised) with Supplements A and B*, EPA-450/2-78-027R, O.A.Q.P.S., Research Triangle Park, NC, July 1, 1997. Codified in 40 CFR Part 51, Appendix W.

CHAPTER 2
APPLICATION PROCEDURES

This chapter describes how sponsors should plan their project, locate needed technical resources, and construct their project application to obtain funding approval from the FAA and AERCs from the State air quality agency. Application procedures for the VALE program are based on statutory and airport program requirements and have been simplified as much as possible to help the sponsor.

2.1 Early Planning and Coordination with State Air Quality Agencies

The VALE program requires an AERC Letter of Assurance from the State air quality agency prior to FAA project approval and funding.[14] Therefore, sponsors should discuss their project proposals for reducing emissions with their State air quality agency in advance of developing their formal project application. The State agency can be helpful in a number of ways, beginning with verification of the nonattainment or maintenance status of an airport area. The State air quality agency can also provide information about appropriate emission reduction strategies, available alternative fuels, and examples of similar activities in the State or region.

The benefits of early coordination with the State air quality agency include better understanding of mutual goals and responsibilities, access to available resources, and development of the organizational relationships that can facilitate timely and constructive State and EPA reviews. Early meetings with the State air quality agency also provide an opportunity to discuss how the sponsor will show that proposed emission reductions are quantifiable, surplus, Federally enforceable, permanent, and adequately supported.[15]

Early coordination between the airport sponsor and the State air quality agency is essential.

The sponsor also needs to inquire about the relationship, if any, of the proposed project to the State Implementation Plan (SIP) and to discuss any previous air quality commitments. States may choose to manage the sponsor's early reductions independent of the SIP or to incorporate these protected airport measures into the SIP through various means.

[14] FAA funded voluntary low emission airport projects must receive AERCs. The AIP Handbook, FAA Order 5100.38C, Sections 580 and 585 ("Low Emission Systems" and "Other Air Quality Projects") describes the difference between required "mitigation" projects and voluntary "stand-alone" projects. For further information, refer to 14 CFR Part 158 (PFC) and to Chapter 7 of this report on AIP and PFC project eligibility.

[15] Emissions reduction criteria are defined in EPA "Guidance on Airport Emission Reduction Credits for Early Measures through Voluntary Airport Low Emission Programs," 2004.

Because SIP revisions take considerable time, the State air quality agency should defer a decision on SIP inclusion until after FAA approvals and implementation of the project. In doing so, the State air quality agency can submit its AERC Letter of Assurance (see **Appendix G**) to the FAA on a timely basis. Time is needed also because some changes to the project are likely to occur between the application period and actual implementation.

2.2 Obtaining Technical Information and Resources to Design a Project

Sponsors should begin by exploring eligible low-emission technologies and the best options to meet their operational needs. Sponsors may want to investigate information about certification of low-emission vehicles, the reliability of equipment and manufacturers, the availability of fuels, and relative costs. Depending on the project, sponsors should consider obtaining technical support to help with fact-finding, project formulation, and the required emissions analysis.

In addition to the information provided in this report, the sponsor may want to obtain information from outside sources. Numerous government agencies and private organizations are available to provide assistance in developing a VALE project.

One resource for sponsors may be the local coordinator for the DOE Clean Cities Program, which was established by the DOE Energy Policy Act (EPAct) of 1992. Many Clean Cities Coalitions exist in metropolitan areas across the nation to work with operators of AFV fleets and with fuel providers who are building refueling infrastructure. Most of the local coalitions are located in areas that have been classified as air quality nonattainment regions. In addition to coordinating activities among AFV stakeholders (manufacturers, fleet users, fuel and service providers, government partners, etc.), the Clean Cities Program also provides grants and specialized technical assistance to help reduce the cost of purchasing AFVs and refueling infrastructure through state energy programs. More information about the Clean Cities Program and its local coordinators is available at the DOE Clean Cities website.

Another resource group is experienced airport sponsors. Contact information for sponsors that have received VALE grants is provided on the FAA VALE website: www.faa.gov/airports/environmental/vale.

In addition, many sponsors have extensive experience in developing and managing low-emissions projects. Among these sponsors are the Massachusetts Port Authority (Boston Logan International Airport), Los Angeles World Airports (Los Angeles International Airport), the Port of Seattle (Seattle-Tacoma International Airport), the Dallas/Fort Worth International Airport Board (Dallas/Fort Worth International Airport), the City and County of Denver (Denver International Airport), and the Port of Portland (Portland International Airport).

2.3 Project Application Phase

Following initial fact-finding and coordination with the State air quality agency, the sponsor can begin to assemble a project application for FAA, State, and EPA review. **Figure 2-1** graphically depicts the application process for FAA funding of VALE projects. The process consists of the following steps:

1. Sponsor notifies FAA regional office of intent to submit a VALE project as early as possible for inclusion on the FAA Airports Capital Improvement Plan (ACIP).

2. Sponsor assembles a draft project proposal (see Section 2.3.1 below) and submits it to the FAA. Early consultation with FAA regional offices on project scope and eligibility is strongly recommended.

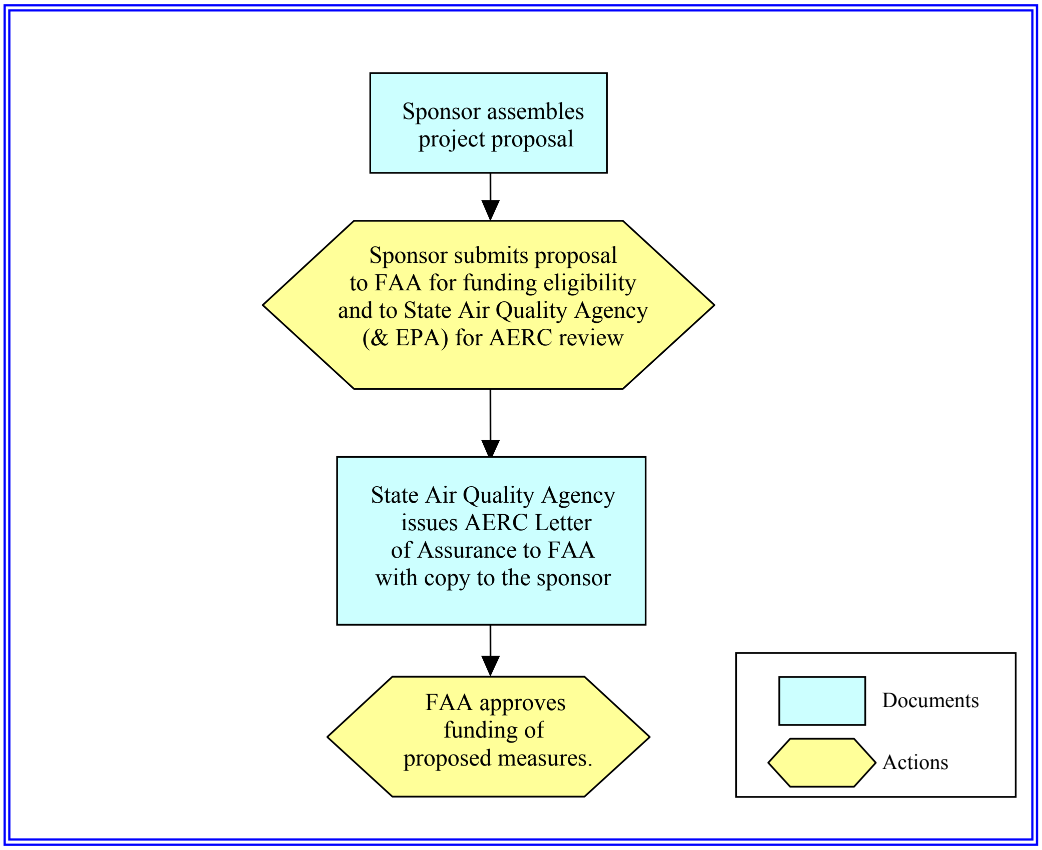
3. Sponsor submits a revised draft proposal to the State air quality agency when project components and emissions calculations are fixed. (Copies of the draft should be sent to the FAA for information and to the EPA for concurrent review.) It is recommended that this submission occur no more than 45 days before the exact amount of the grant request is known and the final project proposal is submitted to the FAA.

4. State air quality agency issues an acceptable *AERC Letter of Assurance* to the FAA (see **Appendix G**).

5. Sponsor confirms eligible costs with the FAA and submits the final proposal to the regional Airports program office and to APP-400.

6. FAA project approval.

Figure 2-1. Flow Chart of Project Application Phase



2.3.1 Assembling a Project Proposal

The project proposal does not need to be lengthy or complex but it must contain all of the necessary application information discussed below. To make this process efficient, the FAA strongly encourages the sponsor to read this Technical Report and the AERC Report completely prior to assembling a proposal.

The sponsor's project proposal should contain the main narrative containing the nine sections described below and four or five appendices. Proposal Appendix A is the EDMS ER Report(s) followed by the *project application worksheets* shown in **Appendix D** of this report and available for use from the VALE website. Proposal Appendix B is a representative summary of EDMS data inputs. Appendix C is the AERC Letter of Assurance from the State air quality agency. Appendix D is the supporting technical and cost information. If applicable, Appendix E is supporting leases, tenant letters, and other documentation assuring the FAA that VALE special conditions will be met for tenant-operated vehicles and equipment.

Project Proposal Main Narrative

Section 1: Project Information

Title information for the application must include the project title, airport three-letter code, airport name, airport sponsor's name, and two airport contacts with their addresses, telephone numbers, fax numbers, and e-mail addresses.

Section 2: Description of Proposed Emission Reduction Measures

This section should be a clear and complete description of the project, containing as much detailed information as possible. Information must include, but is not limited to:

- Numbers and types of proposed vehicles and equipment.
- Owner of each proposed vehicle or unit of equipment.
- Whether proposed new vehicles and equipment would displace existing vehicles and equipment or whether the new vehicles would be purchased instead of other new equipment that is conventionally fueled or higher emitting.
- Project participants, including airlines, other airport tenants, utility companies, State and local governments, etc.
- Graphics on project location and pictures of proposed equipment.
- Project cost information, including total cost, Federal AIP or PFC share, and if AIP, how the required local match will be financed.
- Project need for airport leases or enforceable commitments.

Section 3: Emission Reduction Estimates

The sponsor should quantify the expected emission reductions from the project in tons per calendar year per criteria pollutant. The timeframe for these calculations is determined by the useful life of project vehicles and equipment and may be extended in some cases if the sponsor agrees to replace VALE vehicles and equipment in the future with equivalent low-emission units. The sponsor must cite and justify any supplemental methods or computer models used to derive baseline and project estimates.

Section 4: Confirmation that Estimated Emission Reductions Meet CAA Criteria

The sponsor should refer to Chapter 3 of the AERC Report when preparing the discussion of criteria:

Section 4.1	Quantifiable
Section 4.2	Surplus (see Section 5 below)
Section 4.3	Federally Enforceable
Section 4.4	Permanent
Section 4.5	Adequately Supported

This section of the proposal provides the State air quality agency with confirmation that CAA criteria will be met. For example, the discussion in

Section 4.5 should include the sponsor's financial and organizational capacity to track and maintain funded vehicles and equipment over the life of the project.

Section 5: Relationship to State Implementation Plans
As part of the sponsor's evidence that its proposed early emission reductions are surplus to the SIP, the sponsor should consult with the State air quality agency to identify what, if any, provisions in the SIP or other state agreements might affect the proposed measures or the sponsor's calculation of emission reductions.

Section 6: Funding Sources
This section summarizes total project costs, the amount of requested AIP and PFC funds, the amount and source of required AIP local matching funds, and other local contributions to the program if any. The sponsor should take note of the differences in funding eligibility between AIP and PFC programs (see Chapter 7). AIP and PFC eligibility differences can affect the sponsor's range of options and how the project is designed.

Section 7: Cost Effectiveness
Cost effectiveness is calculated for individual criteria pollutants based on total project dollars divided by total emission reductions for each pollutant achieved over the useful life of vehicles and equipment. Instructions on the way to calculate cost effectiveness are presented in Chapter 9.

Section 8: Vehicle and Equipment Commitments
This section addresses the sponsor's use commitments for project vehicles and equipment in accordance with VALE special conditions and other AIP/PFC requirements:

- Airport-dedicated.
- Operated and maintained at the airport throughout their useful life, and not transferred, re-converted to conventional fuels, or in some other way disabled from providing the expected long-term emission benefits for the airport.
- Supported by enforceable agreements when the sponsor is leasing vehicles and equipment or supporting tenant-owned vehicles and equipment under the PFC program. These agreements must be ready-to-sign prior to funding approval, consistent with the special conditions of the VALE program (see **Appendix C**).
- Replaced during their useful life by equivalent vehicles or equipment with equal or lower levels of emissions. This commitment is related to the CAA requirement that project emission reductions are "permanent." The sponsor may choose to extend this commitment beyond the useful life of individual vehicles or units of equipment for purposes of extending AERCs up to 20 years (see Chapter 9).
- Labeled with the VALE logo prominently displayed.
- Tracked by the sponsor for actual usage rates.

Section 9: Schedule
Clearly define the proposed timeline for completing the application process and implementing major phases of the project (e.g., vehicle acquisition, vehicle deployment, completion of infrastructure). Provide realistic dates and milestones for major activities and project completion dates.

Project Proposal Appendices

Several appendices should be included in a VALE proposal. *Please note the difference between the project proposal appendices discussed below and references to the appendices of this report (in bold).*

Project Proposal Appendix A
This first appendix must start with the "Emissions Reduction (ER) Report", which is the standard and required EDMS output report for VALE projects (see Chapter 9). Calculation of AERC Option years is automatically included in the ER Report if the option is selected in EDMS. (See **Appendix D**, Page 1 of the Project Application Worksheets).

The ER Report(s) should be followed by the VALE project application worksheets (see **Appendix D**). The application worksheets must be filled out completely, including information about the owner of each proposed vehicle or unit of equipment, the useful life or remaining useful life of all vehicles, the vehicle identification number of any replaced/displaced conventionally fueled vehicles, the estimated level of vehicle and equipment usage, and the specifications for proposed low-emission infrastructure and equipment. (Note: If a project consists entirely of vehicles or entirely of infrastructure, the unused worksheets can be eliminated from the application or labeled as "non-applicable").

Project Proposal Appendix B
Include additional summary information on EDMS inputs, EDMS outputs, and the emissions analysis as appropriate. This information should be clearly presented and include the different low-emission vehicle and equipment categories that are part of the project. Do not include all EDMS input and output sheets that are part of or used to develop the summary information. Document any supplemental emission factors or data used for the emission calculations.

Project Proposal Appendix C
Include a signed copy of the required "State Air Quality Agency AERC Letter of Assurance to the FAA" (see **Appendix G**). If the Letter of Assurance is pending, include a draft of the proposed letter, including the name and title of the appropriate State signatory and FAA addressee(s). A signed and acceptable Letter of Assurance is required for project approval.

Project Proposal Appendix D
Include relevant technical and cost information about the proposed equipment or use of the equipment, including documentation that the required competitive bid process has been completed. Technical information may include emission certifications, equipment specifications, and vehicle activity logs.

Vehicles acquired or upgraded through the program must be certified or verified to meet or exceed program low-emission standards. Required documentation will vary by vehicle type. For example, a sponsor purchasing new light-duty vehicles should attach a copy of related EPA low-emission rankings from the EPA Green Vehicle Guide.[16] Sponsors can also submit price quotes from OEMs or dealerships to their proposal as appropriate.

Project Proposal Appendix E
If the project involves tenant-owned or leased equipment, or non-project vehicles using VALE-funded facilities, a signed letter of assurance from the tenant or third-party must be included in this appendix stating that the tenant/party will meet all relevant program assurances and conditions (see **Appendix C**). In addition, the sponsor should include other pertinent information (e.g., draft lease agreement) that describes the sponsor's planned enforcement of VALE program special conditions.

2.3.2 State and EPA Review of Project Proposal

Upon receipt of the sponsor's draft proposal, the State air quality agency has 45 calendar days to review the proposal and make its finding to the sponsor and the FAA. EPA review of the proposal is concurrent with State review. Any comments by the EPA must be received by the State (with copies to the FAA and sponsor) within the 45-day State review period and should not delay the State's response to the FAA. The State air quality agency and the EPA should review the sponsor's proposal according to criteria presented in this guidance and the AERC Report.

A timely State review and AERC Letter of Assurance (see **Appendix G**) to the FAA are critical to the planning and budgeting of the project. Because AIP and PFC programming schedules are tight, a delay by the State in its review and issuance of the AERC Letter of Assurance to the FAA could jeopardize a sponsor's ability to obtain funding for a VALE project in the current fiscal year, representing a project delay for the sponsor of as much as one year.

If the State air quality agency does not respond within the 45-day review period, the sponsor should notify the appropriate FAA regional office. The sponsor, FAA, and EPA should work with the State air quality agency, and other State and local officials, if appropriate, to resolve the delay as soon as possible.

[16] The web address for the EPA Green Vehicle Guide is: www.epa.gov/greenvehicles/.

2.3.3 FAA Funding Approval

The program office should review the draft proposal(s) for technical feasibility and cost effectiveness. Once the FAA has received an acceptable State AERC Letter of Assurance, the FAA funding application can proceed. For the PFC program, the PFC application may then be submitted by the public agency with the attached AERC Letter of Assurance.

The FAA may approve all, some, or none of the proposed airport low-emission measures based on the availability of funding, project cost effectiveness, regional considerations, and other factors in the AIP and PFC decision process. The FAA may also stipulate modifications to proposed measures as needed.

The FAA funding decision is one of several factors that could affect the sponsor's proposal between the application phase and the implementation phase. Other factors that could affect the sponsor's acquisition and deployment of equipment include the availability of new or improved technology, changing usage estimates, unexpected costs, or the status of participating manufacturers or operators.

2.3.4 Format and Distribution of Final Project Proposal

Proposal Format

- Standard page size of 8.5 inches x 11 inches (including any figures or airport maps).
- 12 point font size.
- Include the project title and page number on each page of the proposal.
- The main sections of the proposal and the appendices should be as short and succinct as possible without sacrificing a clear and complete presentation of the material.
- Effective graphics, charts, and maps are encouraged.

Distribution

Airport project applications should be mailed electronically to the appropriate FAA Regional Airports Division Office or Airport District Office and to the program contact for APP-400 (see below). The final application must be a complete package, including the State's AERC Letter of Assurance and financial information; no external material will be accepted.

Copies of the final proposal should also be submitted to the State air quality agency and the EPA Region Office as a courtesy. These copies may be submitted electronically if acceptable to agency representatives.

Contact Information
Sponsors are encouraged to contact their FAA Regional Airports Division Manager or the ADO Manager. The FAA Headquarters contact is Dr. Jake Plante (202) 493-4875, jake.plante@faa.gov in the Airports Office, Planning and Environmental Division, APP-400. Program material is posted on the following FAA Airports website: http://www.faa.gov/airports/environmental/vale

2.4 Project Implementation Phase

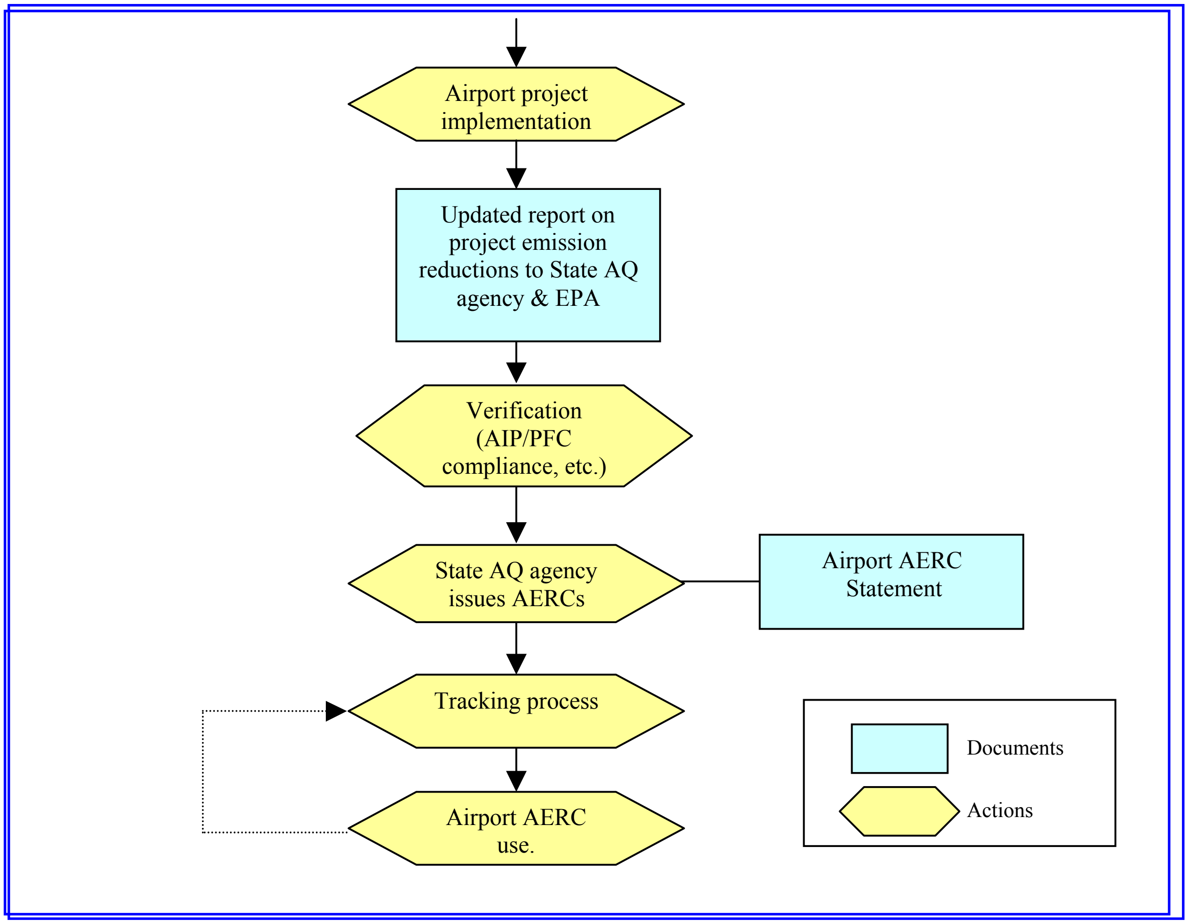
The implementation phase of the VALE program begins with FAA funding approval. **Figure 2-2** illustrates the seven steps to project implementation as listed below.

1. Sponsor orders equipment and begins deployment.
2. Sponsor verifies project implementation.
3. Sponsor revises emission reduction estimates and provides an updated report to the State air quality agency for AERCs, with copies to FAA and EPA.
4. State air quality agency confirms the sponsor's emission reduction calculations.
5. State air quality agency issues AERCs through an AERC statement.
6. Sponsor continues to track the progress of the project.
7. Sponsor uses the AERCs, as needed, for general conformity or NSR requirements.

Following the deployment of equipment, the sponsor is free to decide when to submit an updated project emission reduction estimate to the State air quality agency for AERCs. The sponsor's updated report should reflect any changes in project vehicles and equipment or their usage. In addition, the sponsor should attempt, as practicable, to use actual operations data for updating its project emission reduction estimates (based originally on certification, modeling, and manufacturer data).

The report should be presented to the State air quality agency similar to the initial application. It is expected that State program review during the implementation phase will proceed quickly because of the previous State review of the project application.

Figure 2-2. Flow Chart of Project Implementation Phase



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CHAPTER 3
FUEL ELIGIBILITY AND CHARACTERISTICS

A major goal of the VALE program is to provide commercial service airports with the ability to purchase low-emission vehicles and equipment. To meet this goal, low-emission vehicles and equipment purchased through the program must use alternative fuels or cleaner burning conventional fuels (e.g., gasoline and diesel). Under the VALE program, PFC funding is not limited by fuel type, while AIP funding is only available for vehicles and equipment using eligible alternative fuels.

Congress recognized the need for a more sophisticated approach in Vision 100 as compared with the earlier AIR-21 ILEAV pilot program, which specified only six eligible alternative fuels and a single low-emission standard for light-duty vehicles. In response, the VALE program relies heavily on the expertise of the EPA and DOE to define alternative fuels and to establish "best achievable" low-emission standards for several vehicle categories and weights. Below are the basic funding requirements on the integrated fuel and low-emissions standards for the program:

- Alternative fuels that are substantially non-petroleum based (AIP and PFC eligible)
- Clean conventional fuels (PFC eligible only)
- Best achievable low-emission standards for program vehicles and eligible fuels (AIP and PFC)

The VALE program is fuel neutral to the greatest extent possible. All of the eligible alternative fuels (AIP and PFC) and clean conventional fuels (PFC only) can lead to substantial emission reductions. The sponsor must consider which fuel type does the best job of reducing emissions for the area's Level One pollutant(s), minimizing costs, and meeting logistical requirements for safety, handling, and siting.

This chapter discusses the types of fuels that may be used in low-emission vehicles and equipment acquired through the VALE program, as well as the comparative emissions reduction benefits and other characteristics of those fuels. Within the established framework of the program, sponsors have a great deal of flexibility to determine the fuel that is the most appropriate for their airport and operational needs.

3.1 Eligible Fuels Criteria

The following information is intended to help sponsors understand the characteristics and parameters for alternative fuels, their relative emission benefits, and how to weigh various fuel-related factors in developing a VALE project.

There are some limitations that sponsors need to consider in their selection of alternative fuels. First, new VALE-funded vehicles must meet program low-emission standards, regardless of the fuel used. These low-emission standards are discussed in detail in Chapter 5. Second, the VALE program is restricted to funding of capital improvements and therefore does not pay for O&M expenses, including fuel costs. Third, the sponsor, along with their project partners, must comply with all national safety standards pertaining to alternative fuel use, as appropriate, for all project vehicles and activities undertaken as part of the VALE program.

3.1.1 AIP Eligible Fuels

Under Vision 100, if a sponsor chooses to use AIP funds to purchase low-emission vehicles, these vehicles must be powered exclusively by dedicated alternative fuels as defined by the DOE, not excluding hybrid engine systems. [17]

VALE alternative fuel requirements:
- ***Cleaner burning than conventional petroleum-based fuels***
- ***Primarily non-petroleum based to enhance energy security***

Under designated DOE EPAct guidelines, eligible alternative fuels are as follows:

- Electricity (including photovoltaics)
- Natural gas and liquid fuels domestically produced from natural gas (compressed or liquefied natural gas (CNG or LNG))
- Liquefied petroleum gas (LPG/propane)
- Mixtures containing 85 percent or more by volume of alcohol fuel with gasoline, including denatured ethanol (E85) and methanol (M85)
- Hydrogen
- Coal-derived liquid fuels
- Biodiesel (B85 to B100-biofuel)
- P-series fuels

AIP funding is restricted to alternative fuels only:
- ***Electric***
- ***Natural gas (CNG, LNG)***
- ***Propane (LPG)***
- ***Ethanol 85***
- ***Methanol 85***
- ***Hydrogen***
- ***Coal-derived liquid fuels***
- ***Biodiesel (B85 to B100-biofuel)***
- ***P-Series***

and
- ***Hybrid systems***

[17] Section 301(2) of EPAct defines alternative fuels and sets forth authority for the DOE to add more alternative fuels to the list of authorized alternative fuels, which are defined in Section 301(2). Newly added alternative fuels are called P-series.

These alternative fuels meet the program goals of EPAct – they are cleaner burning than conventional fuels, substantially non-petroleum based, and available domestically to reduce foreign imports.

Hybrid vehicles, which Congress did not want to exclude from full eligibility, must meet program low-emission standards in the same way as other AFVs. Typical hybrid vehicle technology combines gasoline or diesel engines with shared power supply from an electric motor. Most hybrids today are light-duty vehicles although some medium and heavy-duty vehicle manufacturers also plan to offer hybrid electric vehicles using natural gas or propane engines.

3.1.2 PFC Eligible Fuels

The fuel choices for the program using PFC funds are somewhat less restrictive than using AIP funds. However, the underlying requirements for achieving program low-emission standards remain the same. Provided that program low-emission standards are met, the selection of fuels using PFCs is open to all alternative and clean conventional fuels, including clean diesel, clean gasoline, and biofuels.

Difference in program fuel eligibility:

- ***AIP funding requires only alternative fuels as defined by DOE.***
- ***PFC funding allows all alternative fuels plus clean conventional fuels.***

3.2 Clarification of AIP Alternative Fuels Technology

The discussion below provides additional information and clarification on the alternative fuels that are available to the sponsor for their VALE projects under the AIP program.

Domestic Fuel Distinctions

The DOE-designated alternative fuels approved for the VALE program are primarily domestic, burn cleaner than conventional fuels, and lessen the Nation's dependence on imported crude oil. Natural gas is produced from natural gas wells and in conjunction with crude oil wells. Although some natural gas wells are in Canada and Mexico, domestic usage is primarily from U.S. wells. Moreover, gaseous and liquid fuels derived from natural gas (CNG, LNG, and LPG) are designated under EPAct as non-petroleum based fuels. LPG can also be derived from the petroleum refining process, and is not considered to be an exclusively petroleum-based fuel that is part of the oil refining process. Natural gas is distributed through underground pipelines and served to compressors at CNG fueling stations to produce CNG as a vehicle fuel. Natural gas is also delivered through the same underground pipeline to strategically located liquefaction plants to produce LNG as a transportation fuel. LPG is distributed in tanks by truck and is available widely throughout the United States.

Flexible-Fuel Technology

Flexible-fuel vehicles (FFVs) automatically detect the blended fuel composition in the fuel tank and adjust the combustion parameters for optimum engine performance. FFVs are permitted under the AIP program only if a minimum 85 percent fuel blend of eligible alternative fuels is used on a guaranteed basis. Eligible EPAct-designated blended fuels include E85 and M85 and satisfy Vision 100 criterion of primarily non-petroleum based fuels, consistent with DOE eligible alternative fuels. Flexible fuel systems are eligible in forms below the 85 percent minimum level only when the equipment is funded with PFCs and local funds. AIP funds cannot be included in the project. Sponsors are responsible for required assurances that E85, M85, or other eligible alternative fuel blends are used on a permanent and dedicated basis and that program low-emission standards are always met.

Blended-Fuel Technology

Unlike FFVs, other blended fuels (biodiesel) are not adjusted by the combustion technology. These blended fuels must be used on a permanent and dedicated basis in order to assure that program low-emission standards are always met.

Bi-Fuel Technology

Bi-fuel vehicles have the ability to operate on either one fuel or another, but not simultaneously. Generally, bi-fuel vehicles have two or more fuel tanks and the operator can manually switch from one fuel tank to another. Typical bi-fuel vehicles available today do not provide adequate assurance that low-emission fuels are being used and that predicted emission benefits are being realized under actual conditions. As a result, bi-fuel vehicles will not qualify for funding unless both fuels are eligible alternative fuels and the vehicle is EPA-certified or verified to meet program low-emission standards during operation of either fuel source.

Dual Fuel Technology

Dual fuel vehicles have the ability to combust two fuels from separate fuel tanks simultaneously (e.g., CNG and diesel). Dual fuel technology is accepted under the VALE program provided that the technology is EPA-certified to meet program low-emission vehicle standards. Dual fuel systems are distinct from hybrid technology and are AIP and PFC-eligible if both fuels are alternative fuels. If the system uses conventional fuel in any amount, project eligibility is restricted to the PFC program.

Hybrid Technology

Eligible hybrid AFVs must substantially displace the vehicle's gasoline or diesel fuel use and meet the VALE program low-emission standards. In the airport environment, this should be accomplished by the intrinsic nature of airport driving conditions that demand frequent braking, which regenerates the electrical battery portion of the hybrid system. Non-propulsion and accessory functions are not considered relevant hybrid-electric applications for determining vehicle eligibility (e.g., plugging a utility into the car's cigarette lighter).

<u>Fuel Cells</u>

Fuel cells may be thought of simply as batteries that operate with hydrogen and oxygen. The energy released from the oxidation of hydrogen to water is directly converted to an electrical current. Fuel cells may be directly fueled by hydrogen or may use reformers to generate hydrogen from methanol, natural gas, or other hydrocarbons with water. However, adding a reformer increases the cost, bulk, and complexity of the fuel cell system. Fuel cell technology used for power generation or the propulsion of vehicles has a promising future. However, fuel cell systems are primarily in the R&D stage and not yet commercially viable.

3.3 Relative Emission Benefits of Alternative Fuels

Table 3-1 provides a general guide to selecting alternative fuels based on the criteria pollutant causing the nonattainment or maintenance status in the vicinity of the airport. The table provides a quick comparison of each eligible alternative fuel relative to the emission performance of conventional fuels. The relative scale was developed from emissions criteria and databases commonly available on the internet from the EPA, the fueling industry, and several state agencies. To be consistent with the EPA's approach to tail pipe emission standards, the electric emissions criterion is considered to be zero at the tailpipe without consideration of transmission line efficiency or stack emissions at the power plant.

Table 3-1. Alternative Fuels Emissions Performance Relative to Conventional Fuels for Each Criteria Pollutant

AIP Eligible Fuels	**O_3**		**NO_2**	**SO_2**	**PM**	**CO**
	VOC	**NO_x**				
Electric	★	★	★	★	★	★
CNG	●	●	●	●	●	●
LNG	●	●	●	●	●	●
Propane	●	●	●	●	●	●
E85	●	●	●	●	●	●
M85	●	●	●	●	●	●
Hydrogen	★	★	★	★	★	★
B100	●	⊘	⊘	★	●	●

⊘ = worse ● = better ★ = best

Scale is in comparison to baseline emissions from conventional fuels

3.4 Fuel Characteristics

This section describes the characteristics of the cleaner-burning alternative fuels that potentially meet the VALE program low-emission goals. Each alternative fuel discussed is an EPAct-designated fuel and qualifies for AIP and PFC programs. Additionally, these fuels meet the DOE requirements of being substantially non-petroleum based and domestically available to reduce U.S. dependence on foreign oil.

3.4.1 Electricity

Electricity can be used as a transportation fuel to power battery-electric and fuel cell vehicles. Electricity is unique among the alternative fuels in that mechanical power is derived directly from it, whereas the other alternative fuels release stored chemical energy through combustion to provide power. When used to power electric vehicles (EVs), electricity is stored in an energy storage device such as a battery. EV batteries have limited storage capacity and must be replenished by plugging the vehicle into a recharging unit. The electricity for recharging the batteries can come from the existing power grid or from distributed renewable energy sources such as solar or wind.

The principal benefit of using EVs is that there are no vehicle tailpipe emissions. The economic advantage of using EVs, after the relative high initial capital cost, comes through lower “fuel” and maintenance costs. The cost of an equivalent amount of fuel for EVs is less than the price of gasoline. Additionally, maintenance for EVs is less because they have fewer moving parts to service and replace.

3.4.2 Compressed Natural Gas (CNG) and Liquefied Natural Gas (LNG)

Natural gas is a mixture of hydrocarbons, mainly methane, and is extracted from underground either from gas wells or in conjunction with crude oil production. The interest in using natural gas as an alternative transportation fuel stems mainly from its clean burning qualities, its domestic resource base, and its availability via underground pipelines to end-use markets.

Natural gas can be used as a transportation fuel in either a gaseous form (CNG) or as a liquid (LNG). CNG is dispensed into vehicles at 3,600 pounds per square inch (psi), and LNG is dispensed as super-cooled liquid at -260 ºF. In order to achieve comparable travel distances to gasoline or diesel vehicles, CNG is stored onboard as a gas in high-pressure cylinders and LNG is stored as a liquid in super-insulated tanks. To the vehicle user, performance and drivability of natural gas vehicles (NGVs) is essentially the same as for gasoline and diesel vehicles.

Natural gas is safer for storage than other liquid transportation fuels. It is lighter than air and does not pool on the ground, so it poses less of a hazard in the event of a leak or spill. The fuel storage cylinders are, of necessity, much stronger than gasoline or diesel fuel tanks, which is a safety benefit in the event of a collision. Natural gas is odorless, non-toxic and non-corrosive, cannot be absorbed through the skin, and will not contaminate ground water. The familiar "rotten egg" smell associated with natural gas is added as a safety feature for leak detection. Natural gas vehicle fueling systems are sealed or closed loop, so no gas escapes during the refueling process and virtually zero evaporative emissions are produced.

Like electricity, the economic advantage of using NGVs, after the relative high initial capital cost, comes through lower fuel and maintenance costs. Depending upon market conditions, the cost of an equivalent amount of fuel for NGVs can be less than the price of gasoline or diesel. Additionally, maintenance for NGVs can be less because the fuel does not contaminate the engine oil like gasoline and diesel. The most commonly cited benefits of NGVs include extended oil change intervals, increased spark plug life, and extended engine life.

3.4.3 Liquefied Petroleum Gas (LPG or Propane)

Liquefied petroleum gas (LPG or propane) is a mixture of various hydrocarbons (propane, propylene, butane, and butylene) that exist as gases at atmospheric pressure and temperature, and yet liquefy at higher pressures. For all such fuel mixtures in the United States, it is also named for its major constituent, propane. Propane is a natural derivative of both natural gas processing and crude oil refining.

Propane is stored onboard a vehicle at pressures between 130 and 170 psi. Within this pressure range propane exists in a liquid state. Tanks are filled to no more than 80 percent of capacity to allow for liquid expansion as ambient temperatures rise.

Propane is heavier than air and pools on the ground like other liquid transportation fuels. Propane vapors are also heavier than air and will collect at ground level like gasoline and diesel. However, propane vapors will dissipate more rapidly than vapors of gasoline or diesel fuel. Sponsors should consider placing propane storage/dispensing facilities away from confined spaces. The vehicle fuel storage cylinders are much stronger than gasoline or diesel fuel tanks. Propane is considered to be non-toxic and non-corrosive, and will not contaminate ground water.

Propane vehicles are typically converted gasoline or diesel vehicles. The economic advantage of using propane comes from lower fuel and maintenance costs. The cost of an equivalent amount of fuel for propane-powered vehicles can be less than the price of gasoline or diesel, depending on demand fluctuations in the fuel distribution market. Similar to natural gas, propane does not contaminate engine oil the way gasoline and diesel fuels do. Propane-powered vehicles also deliver extended oil change intervals, increased spark plug life, and extended engine life. Propane-powered vehicles exhibit similar tailpipe emission benefits as natural gas-powered vehicles. Propane vehicle fueling systems are also sealed or closed loop, so no gas escapes during the refueling process and virtually zero evaporative emissions are produced.

3.4.4 Hydrogen

Hydrogen (H_2) is being explored for use in internal-combustion engines (ICE) and fuel-cell electric vehicles. H_2 is the simplest and lightest fuel and is a gas at normal temperatures and pressures, which presents greater transportation and storage hurdles than what currently exists for liquid fuels. Storage systems being developed include compressed hydrogen, liquid hydrogen, and chemical bonding between hydrogen and a storage material like metal hydrides.

Unfortunately, hydrogen does not exist naturally as a fuel. H_2 must be produced through one of two current methods. The first is electrolysis and the second is synthesis gas production from steam reforming or partial oxidation.

Electrolysis uses electrical energy to split water molecules into hydrogen and oxygen. The electrical energy can come from any electricity production sources including renewable fuels. Fuel cell vehicles (FCVs) can then use electricity produced from an electrochemical reaction that takes place when the produced hydrogen (from electrolysis or reformation) is oxidized in the fuel cell “stack.” The production of electricity using fuel cells takes place without combustion or pollution and leaves only two byproducts, heat and water.

The predominant method for producing synthesis gas is steam reforming of natural gas, although other hydrocarbons can be used as feedstocks. For example, biomass, and coal can be gasified and used in a steam reforming process to create hydrogen.

Internal-combustion engines used in today’s vehicles convert less than 30 percent of the energy in gasoline to power that moves the vehicle. FCVs that reform hydrogen from gasoline can use about 40 percent of the energy in the fuel.

While no transportation distribution system currently exists for hydrogen transportation use, the ability to create the fuel from a variety of resources and its clean-burning properties make it a desirable alternative fuel.

3.4.5 Ethanol

Ethanol (E100) (ethyl alcohol, grain alcohol, EtOH) is a clear, colorless liquid with a characteristic, agreeable odor. In dilute aqueous solution, it has a somewhat sweet flavor, but in more concentrated solutions it has a burning taste. In the United States, ethanol is made primarily from corn. The grain alcohol produced is denatured or poisoned prior to shipment to prevent ingestion. Like gasoline, ethanol contains hydrogen and carbon, but ethanol also contains oxygen in its chemical structure. The oxygen makes ethanol a cleaner burning fuel than gasoline.

Ethanol is blended with gasoline to improve the burning characteristics of gasoline. For a blend of ethanol and gasoline to qualify as an alternative fuel under the AIP portion of the VALE program ethanol must be mixed or blended to a ratio not less than 85 percent ethanol and 15 percent gasoline. The final product is termed "E85" and is an EPAct designated alternative fuel and qualifies as a primarily non-petroleum based fuel consistent with DOE eligibility requirements. Other blends of ethanol and gasoline may qualify under PFC funding.

The emissions from an E85 powered vehicle are the same as those from a gasoline vehicle, but lower in terms of quantity. E85 cannot be burned in a conventional gasoline vehicle. The vehicle manufacturer makes modifications to the engine and vehicle fuel system to accommodate E85. FFVs are capable of optimizing the vehicle performance when burning ethanol-blended fuels.

E85 fuel is heavier than air and pools on the ground like gasoline. E85 vapors are also heavier than air and will collect at ground level like gasoline. E85 is considered to be toxic and corrosive, since it is blended with potential contaminants from gasoline, and will contaminate ground water. Due to the corrosive nature of some alcohol fuels, fuel pumping and dispensing equipment must be properly designated without aluminum or other materials that are not compatible. Gasoline and diesel pumps cannot be used to dispense alcohol fuels until they have been modified.

3.4.6 Methanol

Methanol (M100) is a clear, colorless liquid with a faintly sweet pungent odor similar to ethyl alcohol. It is fully soluble in water. In the United States methanol is made primarily from natural gas, however it can be made from coal and biomass (e.g., wood). The alcohol produced is poisonous, can be absorbed through the skin, and cannot be made non-poisonous. Methanol, which contains hydrogen and carbon like gasoline, also contains oxygen in its chemical structure. The oxygen makes methanol a cleaner burning fuel than gasoline.

Like ethanol, methanol is blended with gasoline to improve the burning characteristics of gasoline. For a blend of methanol and gasoline to qualify as an alternative fuel under the AIP portion of the VALE program, methanol must be mixed or blended to a ratio not less than 85 percent methanol and 15 percent gasoline. The final product is termed "M85" and is an EPAct designated alternative fuel that qualifies as a non-petroleum based fuel consistent with DOE eligibility requirements. Other blends of methanol and gasoline may qualify under PFC funding.

As a vehicle fuel M85 has similar benefits as E85 in reducing both vehicle tailpipe emissions and evaporative emissions. The types of emissions from an M85 powered vehicle are essentially the same as those from a gasoline vehicle, but lower in quantities.

M85 cannot be burned in a conventional gasoline vehicle. The vehicle manufacturer makes modifications to the engine and vehicle fuel system to accommodate M85. Most FFVs are capable of using M85 as a transportation fuel. Due to the corrosive nature of some alcohol fuels, fuel pumping and dispensing equipment must be properly designed without aluminum or other materials that are not compatible. Gasoline and diesel pumps cannot be used to dispense alcohol fuels until they have been modified.

M85 fuel is heavier than air and pools on the ground like gasoline. M85 vapors are also heavier than air and will collect at ground level like gasoline. M85 is considered to be toxic and corrosive, can be absorbed through the skin, and will contaminate ground water.

3.4.7 Coal-Derived Liquid Fuels

The main fuel in the coal-derived liquid fuel category is Fisher-Tropsch liquids. Fischer-Tropsch technology was developed in 1923 by two German coal researchers, Franz Fischer and Hanz Tropsch. Their technology converts coal, natural gas, and low-value refinery products into high-value, clean burning fuel that can be a replacement for diesel fuel. The resultant fuel is colorless, odorless, and low in toxicity. In addition, it is virtually interchangeable with conventional diesel fuels and can be blended with diesel in any ratio with little to no modification. Fischer-Tropsch fuels offer important emissions benefits compared with diesel, reducing NOx, CO, and PM. Fischer-Tropsch liquids are another way to use alternative fuels in diesel engines without impacting infrastructure or refueling costs. These fuels are slightly less energy dense than diesel, which could result in lower fuel economy and power.

3.4.8 Biodiesel

Biodiesel (B100) (fatty acid alkyl esters) is a cleaner-burning diesel-like fuel replacement made from natural renewable sources such as soybean oil, new and used vegetable oils, and animal fats. Just like petroleum diesel, biodiesel operates in diesel-fueled compression-ignition (CI) engines. Because biodiesel is considered to be a solvent, it should not be stored for longer than 6 months in fuel storage tanks or in onboard vehicle fuel tanks. As an organic substance, long-term storage of bio-fuels can also promote the growth of living organisms in the fuel tanks and should be guarded against. Additionally, the fuel should not come in contact with painted surfaces since the solvent characteristics of the fuel will degrade the paint finish.

Biodiesel should be used only in compression-ignition engines with vehicle fuel systems specially suited for the fuel. It is not advisable to use pure biodiesel in existing diesel powered engines and fuel systems without first consulting with the engine manufacturer. The solvent characteristics of the biodiesel may not be compatible with current engine and fuel system materials such as rubber gaskets and hoses. In some cases, the engines must be retrofitted with synthetic materials that are compatible with the solvent effect of biodiesel.

Biodiesel is desirable as an alternative fuel to diesel because of its clean burning characteristics and resulting lower tailpipe emissions. One disadvantage of biodiesel is an increase in NOx emissions. This tendency is due to high concentrations of polyunsaturated compounds in the fuel. Biodiesel contains no nitrogen or aromatics and typically contains less that 15 parts per million (ppm) of sulfur, so it is compatible with many of the latest diesel emissions aftertreatment equipment designed for ultra low sulfur diesel (ULSD). Biodiesel contains 11 percent oxygen by weight, which accounts for its lower carbon monoxide, particulate, soot and hydrocarbon tailpipe emissions. The energy content of biodiesel is roughly 10 percent less than No. 2 diesel, therefore the vehicle miles per gallon will be reduced by approximately 10 percent. The fuel efficiency is the same as diesel.

Contamination levels in biodiesel can be reduced by storage in tanks kept free of water; tankage should have water-draining provisions on a scheduled basis. Underground or isothermal storage is preferred in order to avoid temperature extremes because high storage temperatures accelerate fuel degradation. Therefore, above ground storage tanks should be sheltered or painted with reflective paint. Fixed roof tanks should be kept full to limit oxygen supply and tank breathing. The use of airtight sealed containers, such as drums or totes, can enhance the storage life of biodiesel. Copper and copper-containing alloys should be avoided with biodiesel due to increased sediment and deposit formation. Contact with lead, tin, or zinc can also cause increased sediment levels that can rapidly plug filters and should be avoided.

3.4.9 P-Series

P-Series fuel is a unique blend of natural gas liquids (pentanes plus), ethanol, and the biomass-derived co-solvent methyltetrahydrofuran (MeTHF). The ethanol and MeTHF can be derived from renewable domestic feedstocks, such as corn, waste paper, cellulosic biomass, agricultural waste and wood waste from construction. P-series fuels are clear, colorless, liquid blends.

These fuels are designed to operate in FFVs that can run on E85, gasoline, or any blend of the two. The P-series fuels emissions are generally below those of reformulated gasoline and are well below federal emissions standards. These fuels are not currently being produced in large quantities and are not widely used.

Table 3-2 below provides a guide for selecting alternative fuels based on selected fuel characteristics. The table provides a quick comparison of each eligible alternative fuel with unleaded gasoline and diesel relative to the selected fuel characteristics. The information was developed from fuel characteristics and databases commonly available on the Internet and from the DOE and fueling industry.

Table 3-2. Fuel Characteristics

Property	Unit	Fuel									
		Diesel (No. 2)*	**Automotive Gasoline***	**Compressed Natural Gas (CNG)**	**Liquefied Natural Gas (LNG)**	**Propane (LPG)**	**Ethanol (E85)**	**Methanol (M85)**	**Hydrogen**	**Biofuel (B100)**	**Biodiesel (B20)***
Higher Heating Value(HHV) (60^{0}F Liquid)	Btu/lb	19,400 avg	20,100 avg	22,179	23,890	21,489	12,770	9,751	61,000	unknown	16,928 - 17,996
	Btu/gal	138,700 avg	125,000 avg	140	84,242	90,830	84,532	64,732		117,000	unknown
(Gas at 60^0 F & 1 atm)	Btu/scf	NA	NA	1,050	1,010	2,516		867	317	NA	NA
Lower Heating Value (LHV) (60^0 F liquid)	Btu/lb	18,300	18,900	20,476	21,501	19,757	11,531	8,559	51,532	unknown	15,700 - 16,735
	Btu/gal	131,000	117,180	124	75,818	83,509	76,331	56,819		115,993	120,900
(Gas at 60^0 F & 1 atm)	Btu/scf	NA	NA	930	909	2,315	unknown	766	267	unknown	unknown
Heat of Vaporization (at boiling point)	Btu/lb	90	150	219	219	183	359	463	192.1	unknown	189
Density:											
Liquid at 60^0 F, except methane	lb/ft^3	52.7	46.4	NA	23.6	31.6	49.5	49.7	NA	unknown	55.7
	lb/gal	7.05	6.2	NA	3.16	4.23	6.62	6.64	NA	unknown	7.450
Gas at 60^0 F & 3,000 psig	lb/ft^3	NA	NA	10.6	10.5	unknown	NA	NA	unknown	NA	NA
Vapor gas at 60^{0}F & 1 atm	lb/ft^3	0.30 – 0.45	0.15 – 0.30	0.0454	0.0423	0.116	0.121	0.084	unknown	NA	NA
Storage Volume Relative to Diesel	%	100%	110%	445%	190%	154%	170%	228%	1,722%	110%	108%
Reid Vapor Pressure	psia	0.02 – 0.2	7 - 14	2,400	NA	189	2.31	4.63	(gas)		<<1
Flammability Limits (by volume)	lower	0.60%	1.40%	5.00%	5.00%	2.00%	3.28%	5.50%	4%	unknown	0.6%
	upper	5.50%	7.60%	15%	15%	9.50%	19.00%	44.00%	75%	unknown	7.5%
Autoignition Temperature	^{0}F	480	495	999	999	919	793	867	1,050	unknown	482

* Only eligible for PFC funding, provided that the tailpipe emissions meet the prescribed program standards.

3.5 Proposed Alternative Fuels Evaluation Checklist

The following checklist is provided to help sponsors to evaluate which alternative fuel(s) would be best for the airport. The considerations presented are by no means exhaustive or applicable to all airports or situations. Additional information comparing the requirements of fueling stations by different alternative fuels is provided in Chapter 6.

General checklist for evaluating alternative fuels for airport use:

1. Asses your existing vehicle fleet
    a. Inventory your current fleet
        i. What vehicles are due to be replaced?
            1. In the current year?
            2. Beyond the current year?
    b. Project future fleet needs
        i. Rate of fleet turnover
        ii. New vehicles needed
        iii. Changes in fleet mix: Auto/LD/MD/HD/Transit/Specialty
2. Analyze the existing fueling infrastructure
    a. Plot service area for existing fueling infrastructure
    b. Fleet fueling assessment
        i. Physical considerations
            1. Location of existing stations
            2. Excess space availability
            3. Local availability of alternative fuel
        ii. Security
        iii. Ingress/egress
    c. Build a new fueling facility?
        i. Evaluate usability
        ii. Determine type of alternative fuel for fueling station
        iii. Design and construction
        iv. Sizing, equipment selection, specifications
        v. Contractors
3. Understand alternative fuel characteristics
    a. Safety parameters (flammability, etc.)
    b. Energy content
4. Economics
    a. Cost of available fuels
    b. Cost to build a fueling station
    c. Ownership or lease options
    d. Partnerships for regional air quality improvements
5. Consider available AFV options
6. Decide on an implementation strategy

CHAPTER 4
GENERAL VEHICLE ELIGIBILITY

The acquisition and conversion of VALE vehicles through the AIP and PFC programs are discussed in this chapter. The areas of discussion include general eligibility requirements for vehicle types, useful life estimates, Federally-eligible reimbursable costs, and retrofit technology for existing vehicles.

To understand vehicle eligibility for the VALE program, the sponsor needs to become acquainted with how project and vehicle requirements differ between the AIP and the PFC programs (Chapter 7). Areas of difference in AIP and PFC program eligibility include allowable fuel types, vehicle ownership, and local cost-share requirements.

4.1 Expansion of Traditional Eligibility for Low-Emission Projects

The AIP and PFC programs are intended to support capital improvement projects at airports. Traditionally, these projects involve publicly owned airport facilities, take place on airport property, and represent easily monitored fixed assets. With this continuing emphasis, Vision 100 expanded AIP and PFC project eligibility to allow earlier funding for more varied low-emission projects at airports, including mobile equipment.

Prior to the VALE program, only a small number of airport-owned vehicles were AIP and PFC-eligible (e.g., fire trucks, snow removal equipment) because of their essential role in airport safety, capacity, and security.[18] Although low-emission models of these vehicle types were eligible, sponsors had to provide the FAA with documentation of a CAA requirement (e.g., general conformity determination) *in advance* of funding approval. It is important to note that this so-called "traditional" eligibility for airport low-emission vehicles and equipment continues to exist apart from the VALE program.

[18] Chapter 5, Section 5, *Safety, Security, and Related Projects,* Airport Improvement Program Handbook, FAA Order 5100.38C, June 2005; and Vision 100, Section 151. Sponsors may continue to use AIP grants and PFC revenue to fund the base cost of traditionally "AIP-eligible" vehicles that meet the criteria presented in this section of the AIP Handbook. Historically AIP-eligible vehicles include airport-owned safety and security-related equipment, including snow removal and aircraft rescue and fire fighting equipment. Thus, if a traditionally AIP-eligible vehicle meets the low emission standards of the VALE program, it is possible for the sponsor to fund both the vehicle's base cost and the low-emission incremental or retrofit costs for the vehicle through the AIP or PFC programs.

4.2 Vehicle Types

The wide variety of vehicles in use at airports is a microcosm of the national vehicle fleet. The VALE program is structured to address these varied technologies, imposing few restrictions on vehicle type. Vehicle eligible for the VALE program include airport-dedicated on-road or ground access vehicles (GAVs) and many types of GSE to support aeronautical services, airport maintenance, airport security, and other essential airport needs.[19]

4.3 Airport-Dedicated Vehicles

All vehicles and equipment purchased or converted under the VALE program must be "airport-dedicated", meaning that they must be an integral part of the aeronautical, transportation, security, or maintenance services at the airport, used on a regular basis in normal operation of the airport, and stored and maintained within the airport boundary. Use of on-road vehicles outside the airport boundary is permitted only if such use is minor, intermittent, and related to its primary mission to deliver airport services at the airport.

The requirement for vehicles to be airport-dedicated is consistent with AIP and PFC program management. In addition, this requirement prevents potential overlap with other Federal transportation programs and related emission reduction measures already considered as part of metropolitan transportation plans and transportation improvement programs reflected in the transportation conformity process.

Airport-dedicated vehicles include most GSE and many on-road vehicles, such as airport parking lot shuttles and buses, airport security vehicles, and airport maintenance vehicles. Vehicles that are not eligible include general use automobiles, buses, taxicabs, limousines, rental cars, super shuttles, and other vehicles that operate to and from the airport as part of a regional transportation circuit or inter-airport service.

4.4 Vehicle Use

Vehicle owners are expected to operate vehicles acquired under the VALE program at the same level of use that was estimated in the airport sponsor's VALE project proposal. Vehicle owners may not substantially reduce their use of program vehicles or park these vehicles for extended periods of time without prior notification to the FAA (and sponsors if vehicles are tenant-owned). If any substantial change in projected or typical vehicle use occurs (e.g., hours or mileage), the sponsor and owners must provide timely notice to the FAA with updated project emission reduction estimates. This information must also be provided to the State air quality agency and the EPA.

[19] Segways, for example, are considered non-essential and therefore are not eligible.

4.5 Useful Life for Typical Airport Vehicles

All vehicles acquired or converted under the VALE program must remain in operation at the airport for their useful lives (see **Chapter 8 and Appendix C** for "Special Conditions"). **Table 4-1** provides average useful life data for typical new airport vehicles. These estimates should be used to calculate VALE project emission reductions unless a specific vehicle type (e.g., specialized GSE) is not included in the table or the sponsor can document more refined data to support modification of the estimate provided in the table.

Airport-dedicated vehicles represent a variety of on-road and non-road vehicles. Because these 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, airport air quality studies, and discussions with manufacturers, users, and airport consultants.

Table 4-1. Average Useful Life of Typical Airport Vehicles

Category/Type	Average Useful Life (years)
GSE	
Baggage tug	13
Belt loader	11
Aircraft tractor	14
Cargo loader	11
Lavatory truck	13
Cabin service truck	10
Water service truck	10
Deicer trucks	14
Fork lifts	13
Fuel cart	14
Construction equipment	10
Lawn care equipment	10
Snow removal equipment	10
Mobile ground power unit	10
Emergency equipment	10
GAV	
Cars/vans/pickup trucks	10
Flatbed/large trucks	12
Vacuum sweeper trucks	10
Fuel trucks	14
Dump trucks	11
19-35 foot buses	10
40+ foot buses	12

4.6 New Vehicles and Incremental Costs

For purposes of the VALE program, new vehicles are defined as vehicles purchased from an OEM or an associated dealer that are pre-market (i.e., "neofits") with essentially zero miles. No retrofits, re-engined vehicles, or aftermarket modifications qualify as new.

VALE program funding for new vehicles is restricted to the *incremental* cost of the vehicles. Incremental cost is defined as the differential in cost between the higher price for an eligible low-emission vehicle and the current market value for a new equivalent conventional fuel (i.e., gasoline or diesel) vehicle. Vehicle *base* costs are not eligible.

The VALE program simply offers a way to offset the higher purchase price of a low-emission vehicle (i.e., incremental cost) as a factor in the owner's decision about replacing a vehicle. By making low-emission vehicles no more expensive to purchase than conventional-fuel vehicles, the VALE program provides a reasonable incentive to buy cleaner vehicles.

The VALE program cannot be used under any circumstances to help finance the non-incremental base costs of airport low-emission vehicles. Vehicle owners must buy necessary new vehicles on their own. Moreover, sponsors may not use base costs for local matching funds or as any part of VALE grant and cost effectiveness calculations.

> ***Incremental cost is the differential between the higher cost of an eligible low emission vehicle and the current market value for a new equivalent conventional fuel vehicle.***

In addition, program eligibility for all vehicles (new or retrofit) is limited to capital improvement costs and does not extend to O&M costs, including fuel.

4.7 Vehicle Retrofit Technology

The FAA prefers new vehicles to retrofits because new vehicles have longer useful lives, more reliable emissions savings, and greater cost-effectiveness. However, because it is not always feasible to purchase new vehicles and because verified retrofit technology has been shown to lower vehicle emissions, the FAA allows sponsors to acquire retrofit technology for existing vehicles. VALE retrofit projects must follow all of the airport, project, and vehicle eligibility requirements of the VALE program unless otherwise noted below.

Verified retrofit aftermarket technology may be purchased through the VALE program for application on existing airport vehicles. An engine "retrofit" includes, but is not limited to, any of the following activities:

- Addition of new/better pollution control after-treatment equipment to certified engines
- Re-engining or re-powering
- Upgrading of certified engines to cleaner certified configurations
- Upgrading uncertified engines to cleaner "certified-like" configurations
- Conversion of engines to cleaner fuels
- Early replacement of older engines with newer (presumably cleaner) engines (in lieu of regular expected rebuilding)

Only aftermarket low-emission technology that has been officially verified by the EPA or the California Air Resources Board (CARB) may be used to retrofit existing airport vehicles and equipment. For purposes of the VALE program, qualified vehicle retrofit technology is defined as the low-emission equipment and devices that are listed on the EPA website, www.epa.gov/otaq/retrofit under the menu selections: "Diesel Retrofit Technology Verification" and "Verified Technologies List". Qualified retrofit technology extends to equipment and devices covered under the EPA and CARB Memorandum of Agreement, entitled "Coordination and Reciprocity in Diesel Retrofit Device Verification" (see links to "Memorandum of Agreement" and "CARB Verification Program" on the EPA website above).[20]

Airport sponsors must provide documentation that the proposed retrofit after-treatment technology (e.g., particulate filters, catalytic converters, oxidation catalysts) is verified by EPA or CARB. In addition, the sponsor must provide or attach information in its VALE project application to meet the following requirements:[21]

- The vehicle identification number (VIN) for each existing vehicle that is proposed for retrofitting ("target vehicle").
- Assurance that the target vehicle has a remaining useful life (RUL) of at least seven years.
- Written confirmation from the manufacturer that the proposed retrofit technology or device is applicable to the engine type, model year, and configuration of the target vehicle if specific matching reference to the EPA or CARB verified products lists is unclear.
- Analysis of estimated emissions benefits and cost-effectiveness using required program methodology, including models, reports, and project application worksheets (see **Chapter 9** and **Appendix D**).
- Assurance that program funding is not being used to retrofit a vehicle for a second time, regardless of how the initial retrofit of the vehicle was performed.

[20] Because no practical method exists for comparing new and retrofit vehicle low-emission ratings, vehicle retrofits proposed under the VALE program are not subject to VALE low-emission standards for new vehicles (see Chapter 5). As a result, the FAA will give priority consideration to retrofit projects that achieve the greatest emission reductions per dollar spent.

[21] The sponsor is responsible for any uncertainties or lack of information that may exist regarding the required verification.

Eligible expenses include the full cost of retrofitting existing vehicles with verified low emission equipment, notwithstanding AIP local matching requirements. Similar to costs for new low-emission vehicles, reasonable costs are also permitted for refueling or recharging equipment needed in support of retrofit vehicles that are powered by alternative fuels.

Although AIP and PFC eligibility requirements for vehicle retrofits are similar (see above), the use of AIP funding for vehicle retrofits is more restrictive due to the limited authorization for vehicle retrofits through the *Airport Ground Support Equipment Emissions Retrofit Pilot Program.*[22] Additional terms or restrictions under the AIP pilot program for retrofit vehicles include:

- A limit of ten projects, each eligible for no more than $500,000.
- The definition of eligible equipment as "ground service or maintenance equipment that is located at the airport [and] is used to support aeronautical and related activities at the airport…" (Vision 100)
- Priority consideration for eligible equipment that is airport-owned versus possible tenant-owned equipment through the PFC program.
- FAA Headquarter approval of pilot project applications. Sponsors that apply for AIP retrofit pilot projects should follow standard application procedures (see Chapter 2). FAA regional offices will consider the sponsor's application for completeness and Headquarters (APP-400 and APP-520) will perform the technical and financial evaluations.

[22] 49 U.S.C. §47140 per *Vision 100,* Section 159.

CHAPTER 5
PROGRAM LOW-EMISSION STANDARDS FOR NEW VEHICLES

In accordance with Vision 100, the FAA has established new vehicle low-emission standards for the VALE program that represent the best achievable standards for emissions performance. These standards reflect the need for a balance between emission reductions and the commercial availability of proven low-emission technology. To maintain an appropriate balance, the FAA will review and update its vehicle low-emission standards and requirements annually in consultation with the EPA.

Vehicles and engines that are eligible for AIP or PFC funding under the VALE program must either be EPA certified (new vehicles) or EPA verified (retrofit technology). Information about eligible retrofit aftermarket vehicle technology is provided in Chapter 4.

This chapter specifically addresses new vehicles, which must be obtained directly from an OEM or an associated dealer to be eligible under the VALE program. VALE low-emission standards for new vehicles are based on EPA-certified national emission standards and are referenced in some cases to comparable California Air Resources Board standards. Eligibility is determined by the most recent year of vehicle certification data.

The main purpose for establishing program low-emission vehicle standards is to ensure project cost effectiveness (i.e., lifetime emission reductions per project dollars spent). Accordingly, the FAA will not fund low-emission projects that simply offer a marginal benefit in the near term. By setting challenging emission standards at cleaner levels than presently regulated emission levels, the FAA seeks to invest in capital equipment that provides substantial emission reduction benefits over many years.

The FAA is also interested in simplifying low-emission standards for sponsors by focusing solely on tail pipe emissions. Although the emissions from evaporation of fuels, hot soak, and crankcases are sometimes substantial, the inclusion of these emissions would increase the complexity of the VALE program.

The VALE program is based on EPA tailpipe emissions and not the "well-to-wheels" approach that accounts for the full energy production cycle, including emissions from power plants, transmission losses, etc.

The VALE low-emission standards apply to all eligible fuel types, whether they are AIP-eligible (alternative fuels) or PFC-eligible (alternative fuels and clean conventional fuels). For purposes of the PFC program, "clean conventional fuels" are eligible options if they lower vehicle emissions to meet VALE low-emission standards.

Because VALE project applications and lifetime emission estimates are based on existing emission standards for the year of AIP or PFC funding, sponsors do not have to reassess emission reduction estimates or to replace vehicles and equipment purchased or upgraded through the VALE program in response to future changes in national EPA emission standards or in VALE program low-emission standards.

5.1 Relationship of Federal Vehicle Emission Classes and VALE Low-Emission Categories

The VALE program low-emission standards described below for new vehicles are based on a number of factors related to EPA national standards. The EPA (and CARB) classifies vehicles by size and use, engine type, and weight when assigning emission standards. For instance, vehicles are described as either on-road or non-road depending upon their use. The EPA defines on-road vehicles primarily by weight class, such as light, medium, and heavy duty. Non-road vehicles are defined primarily by engine type, such as spark-ignited (e.g., gasoline) versus compression-ignited (e.g., diesel), and by engine horsepower (hp) ratings. **Table 5-1** below presents the EPA classifications for on-road vehicles and the corresponding low-emission categories for the VALE program.

Table 5-1. Federal Vehicle Emission Classes and Corresponding VALE On-road Categories

Federal Cutpoints Applied to VALE Standards (GVWR in pounds)	Federal Class	VALE On-Road Categories
Passenger Cars and Trucks ≤ 6,000	PC LDT1 LDT2	1 LDV
Trucks 6,001 - 8,500	LDT3 LDT4	2 MDV
Comp. HDV < 10,000, < 6' Cargo Box, ≤ 12 Seats/≤ 9 Rear	MDPV	
HD Vehicles or Trucks >8500 and Not MDPV	HDV	3 HDV

GVWR – Gross vehicle weight rating
PC – Passenger car
LDT – Light duty truck
LDV – Light duty vehicle
MDPV – Medium duty passenger vehicle
HDV – Heavy duty vehicle

Developing effective low-emission vehicle classifications and standards for the VALE program is difficult for several reasons. Sometimes EPA low-emission standards for certain vehicle categories are not stringent enough for some pollutants, and sometimes they are too stringent, at least for the next few years while vehicle manufacturers endeavor to meet them. In addition, EPA low-emission standards are generally developed on the basis of fleet averaging and monitored by the EPA according to individual manufacturers. In contrast, the VALE program is focused on the acquisition of individual airport vehicles that meet applicable low-emission standards regardless of manufacturer or fleet ownership.

Light duty vehicles (LDVs) are a good example of EPA fleet averaging for emissions. Specifically, the total population of LDVs produced within a model year is balanced by emissions performance centered on the EPA Tier2-Bin5 emissions standard (ranging from the cleanest Bin1 to the dirtiest Bin8). In contrast, the best achievable low-emission standard for LDVs purchased and deployed under the VALE program, Tier2-Bin3, is more stringent than the Tier2-Bin5 industry fleet average. Based on EPA national fleet standards, VALE standards pursue the best performing individual vehicle technology for lowering emissions at specific airports.

The following VALE program low-emission standards for new vehicles are intended to produce the greatest emission reductions and associated AERCs. The emission standards are broken down into five vehicle categories, consisting of three standards for on-road vehicles and two standards for non-road vehicles:

- On-road light duty vehicles and trucks (LDVs and LDTs)
- On-road medium duty vehicles (MDVs)
- On-road heavy duty vehicles (HDVs)
- Non-road spark-ignition (SI) vehicles
- Non-road compression-ignition (CI) vehicles

<u>It is important to note that dedicated electric drive vehicles</u>, which EPA rates as zero emissions, meet the program standards in all vehicle categories.

5.2 On-road Program Low-Emission Standards

The following three subsections describe on-road vehicle program standards.

5.2.1 Vehicle Category 1 – On-road LDVs

Vehicle Category 1	Program Low-Emission Standard
On-road Light-Duty Vehicles (LDVs)	Combined EPA Tier2-Bin2 and EPA CO_2 ratings

Vehicle Category 1 is limited to on-road light duty vehicles (LDVs), including passenger cars (PCs) and lighter duty trucks (LDT1 and LDT2) that would be used at an airport. The vehicles in this category cannot weigh mores than 6,000 pounds gross vehicle weight rating (GVWR).[23] Relative to GSE and other airport service vehicles, on-road LDVs represent a small population at airports.

The program Category 1 standard is a combined standard for criteria pollutants and greenhouse gases. It is based on EPA Green Vehicle Guide ratings of 0-10 on Air Pollution and Greenhouse Gas Scores. The web address for the EPA Green Vehicle Guide is: www.epa.gov/greenvehicles/.

The program standard for Category 1 is set between the EPA "SmartWay" and "SmartWay Elite" classifications. Eligible low-emission vehicles must score "8" or higher on both the Air Pollution Score (equal to the Tier2-Bin2 certification level) [24] and the Greenhouse Gas Score, and must achieve a combined score of at least 17 when added together. In effect, one of the two scores must be at the cleaner level of "9" or "10".

Commercial Availability. Vehicle eligibility under Category 1 applies to the last complete model year or new model year listed in the EPA Green Vehicle Guide. Several small and mid-size passenger vehicles meet Category 1 program standards, including several hybrids: Ford Fusion, Lincoln MKZ, Mercury Milan, Honda Civic, Nissan Altima, and Toyota Camry.[25] Also, the CNG-fueled Honda Civic is potentially eligible, as are all-electric vehicles. Eligibility depends on whether the vehicle is manufactured in the U.S. and, in some cases, whether the California-certified version of the vehicle is selected.

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[23] GVWR is the value specified by the manufacturer as the maximum design loaded weight of a single vehicle (40 CFR 86.1803-01).

[24] Regarding the Air Pollution Score, manufacturers can certify vehicles under Federal emission standards or cleaner California emission standards. If necessary, sponsors should contact manufacturers to determine the national availability of California-certified vehicles.

[25] The Toyota Prius hybrid does not currently meet the AIP "Buy American" requirement but is expected to do so in the future with Toyota's plans to manufacture hybrid vehicles in the United States.

5.2.2 Vehicle Category 2 – On-road MDVs

Vehicle Category 2	Program Low-Emission Standard
On-road Medium Duty Vehicles (MDVs)	EPA Tier2-Bin5

Vehicle Category 2 is limited to medium size vehicles (MDVs) that weigh over 6,000 pounds GVWR.[26] Vehicles in this category include passenger and cargo vans (MDPVs) and heavier light duty trucks (LDT3 and LDT4). Vehicles of this size are popular at airports nationwide because of their passenger and cargo storage capacities. Fleet averaging methodology applies to certified emissions from MDVs as well as for the smaller VALE Category 1 LDVs. Because the industry averages emissions for MDVs and LDVs together, the heavier MDVs are typically found on the "dirtier" side of the fleet average standard of Tier2-Bin5.

Commercial Availability. Based on EPA Green Vehicle Guide Air Pollution Scores for the last complete or new model year, several pick-up trucks may meet Vehicle Category 2 standards. An Air Pollution Score of "5" equals the Tier2-Bin5 certification level. However, because the EPA does not publish certified vehicle weights, these data need to be obtained from the manufacturer and then verified with the FAA and EPA. Eligible vehicles in this category include the following hybrid gasoline-electric models: GMC Sierra (6,400 GVWR), GMC Yukon 1500 (7,200 GVWR) Chevrolet Silverado (6,100 GVWR), and Chevrolet Tahoe 1500 (7,100 GVWR). Also, the dedicated CNG Ford 350 van (8,700 GVWR) may be eligible, as well as any all-electric vehicles in this category.

Flexibility Provision. In recognition of the current limited availability of MDVs at the Tier2-Bin5 level, particularly vans, sponsors have the option of acquiring MDVs (including hybrids) that are EPA-certified to meet Tier2-Bin5 standards for the applicable Level One pollutants only. For example, if an airport is located in an ozone nonattainment area, the proposed vehicle only needs to meet the low-emission standards for nitrous oxides (NOx) and non-methane organic gases (NMOG). In a CO nonattainment area, the proposed vehicle only needs to meet the low-emission standard for CO. In a PM nonattainment area, the proposed vehicle only needs to meet the low-emission standard for PM.

The FAA provides this flexibility provision because of the shortage of vehicles in this category to meet the low-emission standards at this time. The sponsor may use this provision only when the VALE program application includes a demonstration that no reasonable commercial options are available for similar vehicle types that meet the VALE program low-emission standards for all

[26] EPA does not publish certified vehicle weights. Consequently, sponsors should verify Category 2 vehicle weights with the FAA and EPA using manufacturer data and documentation.

pollutants. Sponsors should consult the EPA Green Vehicle Guide website, OEMs, and other information sources in making this demonstration.

New technology is expected to meet the Vehicle Category 2 standards soon. Once reasonable commercial availability exists for this category, then the flexibility provision will no longer be valid.

5.2.3 Vehicle Category 3 – On-road HDVs

Vehicle Category 3	Program Low-Emission Standard
On-road Heavy-Duty Vehicles (HDV)	EPA On-road Heavy-Duty Emission Standards (g/bhp-hr) 0.17 - NOx 0.13 - NMHC 6.5 - CO 0.009 - PM

Vehicle Category 3 is limited to HDVs, which represent the largest on-road vehicles weighing more than 8,500 pounds GVWR, such as fueling and catering trucks.[27] The EPA HDV standards for the VALE program are: 0.17 grams per brake horsepower hour (g/bhp-hr) for NOx, 0.13 g/bhp-hr for non-methane hydrocarbons (NMHC), 6.5 g/bhp-hr for CO, and 0.009 g/bhp-hr for PM.

The latest EPA heavy-duty diesel vehicle (HDDV) emission standards were fully implemented in 2010 with the support of credits from the averaging, banking, and trading program (ABT Program). The on-road HDDV emission standards complement the 2006 on-road HDDV mandate regarding ultra-low sulfur diesel fuel (ULSD).

Commercial Availability. Engine manufacturers including Cummins Westport, BAF Technologies, Doosan Infracore America, and Baytech Corporation have certified natural gas (CNG) engine technologies that meet the Category 3 standards. Likewise, the standards are met by Clean Fuel USA and Baytech Corporation with propane (LPG) engine technologies, by Capstone Turbine Corporation with diesel-hybrid technology, and by Azure Dynamics with gasoline-electric hybrid technology. Within this category, several manufacturers produce "medium-heavy duty" and "heavy heavy-duty" engines, which in some cases are designed for urban buses. This information indicates that the commercial potential exists in the near term to achieve the low-emission standards for Vehicle Category 3, thus eliminating the need for a flexibility provision in this category.

[27] An exception is MDPVs, which can weigh up to 10,000 pounds GVWR.

5.3 Non-road Program Low-Emission Standards

The following two subsections describe the VALE program low-emission standards for non-road vehicles. Non-road standards differ from on-road standards in that they are based on the horsepower (hp) of the engine rather than the vehicle weight (GVWR).

Because the non-road standards presented below are for SI and CI engines, sponsors interested in purchasing non-road alternative fuel vehicles (AFVs) are allowed to meet the less stringent standards between Vehicle Category 4 (SI) and Vehicle Category 5 (CI/diesel) for each certification pollutant.

5.3.1 Vehicle Category 4 – Non-road Spark-Ignition Vehicles

Vehicle Category 4	Program Low-Emission Standard
Non-Road SI Vehicles	EPA Blue Sky Engine Program

The only regulatory mechanism that preserves adequate cost effective emission reductions for large SI non-road engines is the EPA's voluntary Blue Sky Engine Program, which mandates qualifying emission standards of 0.6 g/bhp-hr for HC+NOx and 3.28 g/bhp-hr for CO. EPA-certified vehicles that meet Blue Sky Engine Program low-emission standards are eligible under the VALE program. Because the Blue Sky Engine Program does not set a PM standard, the on-road standard for PM was applied for consistency.

Commercial Availability. Vehicles in this category include forklifts, electric generators, aircraft GSE, and various types of construction and industrial equipment. We are unaware of specific engine manufacturers with certified products under the Blue Sky Engine Program but many electric equipment manufacturers that produce battery-powered GSE and other electric non-road vehicles meet the Category 4 standards. Therefore, sponsors are encouraged to pursue electric and other AFVs certified to meet the Blue Sky Engine Program standards.

Flexibility Provision. There may be non-road vehicle types that do not have a commercially available electric version or equivalent that meets the low-emission standards for all pollutants. In this case, the FAA provides the flexibility to acquire non-road vehicles (including hybrids) that are EPA-certified to meet the less stringent standard of VALE Vehicle Categories 4 and 5 for the applicable Level One pollutant(s) only.

For example, if an airport is located in an ozone nonattainment area, the proposed vehicle only needs to meet the low-emission standards for NOx and HC. In a CO nonattainment area, the proposed vehicle only needs to meet the low-emission standard for CO. In a PM nonattainment area, the proposed vehicle only needs to meet the low-emission standard for PM.

The FAA provides this flexibility provision because of the shortage of vehicles in this category to meet the low-emission standards at this time. The sponsor may use this provision only when the VALE program application includes a demonstration that no reasonable commercial options are available for similar vehicle types that meet the VALE program low-emission standards for all pollutants. Sponsors should consult the EPA Green Vehicle Guide website, OEMs, and other information sources in making this demonstration. Once reasonable commercial availability exists for this category, then the flexibility provision will no longer be valid.

5.3.2 Vehicle Category 5 – Non-road Compression-Ignition Vehicles

Vehicle Category 5	Program Low-Emission Standard
Non-road CI Vehicles	EPA Tier 4 standards

EPA Tier 4 non-road diesel engine emission standards apply to Vehicle Category 5. These stringent low-emission standards for non-road diesel engines, which began in 2008, are based on the use of ULSD fuel and the growing ability of non-road engine manufacturers to incorporate advanced clean engine technologies to meet Tier 4 emission requirements.

Commercial Availability. The FAA is aware of many electric equipment manufacturers that produce battery-powered GSE and other electric non-road vehicles that meet the low-emissions criteria for this vehicle category. Therefore, sponsors are encouraged to pursue electric and other AFVs certified to meet the Tier 4 Standards.

Flexibility Provision. There may be non-road vehicle types that do not have a commercially available electric version or equivalent that meets the low-emission standards for all pollutants. In this case, the FAA provides the flexibility to acquire non-road vehicles (including hybrids) that are EPA-certified to meet the less stringent standard of VALE Vehicle Categories 4 and 5 for the applicable Level One pollutant(s) only.

For example, if an airport is located in an ozone nonattainment area, the proposed vehicle only needs to meet the low-emission standards for NOx and HC. In a CO nonattainment area, the proposed vehicle only needs to meet the low-emission standard for CO. In a PM nonattainment area, the proposed vehicle only needs to meet the low-emission standard for PM.

The FAA provides this flexibility provision because of the shortage of vehicles in this category to meet the low-emission standards at this time. The sponsor may use this provision only when the VALE application includes a demonstration that no reasonable commercial options are available for similar vehicle types that meet the VALE program low-emission standards for all pollutants. Sponsors should consult the EPA Green Vehicle Guide website, OEMs, and other information sources in making this demonstration. Once reasonable commercial availability exists for this category, then the flexibility provision will no longer be valid.

5.4 Summary of VALE Program Low-Emission Vehicle Standards

The standards presented in **Table 5-2** are currently in effect to ensure the best achievable program emission benefits. These standards will be reviewed annually and may be modified in the future, in consultation with the EPA, to reflect changing EPA standards, advances in vehicle, engine, and tailpipe technologies, and FAA program cost-effectiveness considerations.

Table 5-2. Summary of VALE Low-Emission Standards for New Vehicles

On-road Vehicles:

Vehicle Category	Vehicle Classification	Best Achievable Low-Emission Standard	NOx (g/mile)	NMOG (g/mile)	CO (g/mile)	PM (g/mile)
1	LDV & LDT	Tier2-Bin2 (and EPA Green Vehicle Score)	0.02	0.01	2.1	0.01
2	MDV[1]	Tier2-Bin5	0.07	0.09	4.2	0.01
			NOx (g/bhp-hr)	NMHC (g/bhp-hr)	CO (g/bhp-hr)	PM (g/bhp-hr)
3	HDV	Alternative, diesel, and gasoline engines	0.17	0.13	6.5	0.009

1) EPA 120,000 mile certification level standards for this category (ref. www.epa.gov/otaq/standards/index.htm)

Non-road Vehicles:

Vehicle Category	Vehicle Classification & Standard	Maximum Engine Power (hp)	NOx (g/bhp-hr)	HC (g/bhp-hr)	NOx + HC (g/bhp-hr)	CO (g/bhp-hr)	PM (g/bhp-hr)
4	Non-Road Spark-Ignitition (SI) Blue Sky Engine Program Standards for any engine/fuel type	> 25	0.48[1]	0.12[1]	0.6	3.28	0.01[2]
5	Non-road Compression-Ignition (CI) Based on EPA Tier 4 standards for any engine/fuel type	< 75.1	NA	NA	3.50	3.73	0.02
		75.1 ≤ HP < 174.3	0.30	0.14	0.44	3.73	0.01
		174.3 ≤ HP ≤ 751	0.30	0.14	0.44	2.61	0.01
		HP > 751	0.50[3]	0.14[3]	0.64	2.61[3]	0.02[3]
			2.61	0.14	2.74	2.61	0.03

1) The voluntary EPA Blue Sky Engine Program only establishes a combined standard for HC+NOx for large SI non-road engines. Based on discussions with EPA, an 80/20 split is assumed between NOx and HC for purposes of certifying engines to meet program standards.

2) There is no Blue Sky Engine Program standard for PM in this category. Consequently, the on-road standard for PM has been adopted.

3) Emission standards apply to non-road diesel engines greater than 751 Hp that power generator sets only.

CHAPTER 6
INFRASTRUCTURE ELIGIBILITY AND FUEL FACILITY GUIDELINES

This chapter discusses the eligibility of infrastructure projects for VALE program funding, the useful life of such infrastructure, and fuel facility guidelines.

6.1 Infrastructure Project Eligibility

VALE program funding can be used to purchase, construct, and install many types of low-emission infrastructure systems. Activity in this area may include reducing airport emissions by displacing mobile equipment, increasing energy efficiency, or reducing the consumption of conventional fuels through the use of new, upgraded, or converted equipment or facilities. To be eligible for VALE program funding, the low-emission infrastructure improvements must be cost effective, use alternative fuels, and incorporate proven technology. Any infrastructure and equipment projects that are not discussed in this chapter but that might qualify under the VALE program should be discussed with the FAA early in the planning process.

Infrastructure development funded under the VALE program must be located within the airport boundary. Airport sponsor ownership of equipment is required in most instances and generally preferred to ensure accountability and to avoid potential problems with tenants that relocate or experience financial difficulties (see Chapter 7).

For any infrastructure project, the sponsor must demonstrate that the main purpose of the project is to reduce airport emissions. The sponsor must also show that the proposed activity is in compliance with all AIP, PFC, and VALE program funding conditions and requirements.

Eligible infrastructure projects for the VALE program must be designed <u>primarily</u> for airport emission reductions.

Program infrastructure funding through the VALE program is limited to the area within the airport boundary and further limited to the portion of an eligible airport project that is directly associated with the VALE program. For example, funding for electric power upgrades to support gate electrification or vehicle rechargers is limited to system elements within the airport boundary as well as to electrification demand that is directly related to eligible VALE activities, excluding other airport or facility electrification needs that may or may not be AIP or PFC eligible otherwise. Consequently, the FAA will not award VALE AIP discretionary resources for measures that are indirectly related or incidental to VALE technology.

6.1.1 Refueling and Recharging Stations

AFV refueling and recharging stations are eligible for VALE program funding, including fast-chargers, on-site fuel storage tanks, and other stationary components needed for station operation.

The size of the proposed refueling or recharging station(s) must match the planned and reasonably foreseeable fueling requirements of the airport. Sponsors may size the facility to the maximum size needed to service the anticipated level of project AFVs, plus some additional limited capacity for public fleets (see discussion of public access below). In applying for facility and equipment funding, the sponsor must clearly document the number of project AFVs, other airport-dedicated AFVs, and public AFVs that will access the facility. Sponsors must provide letters of commitment from non-airport AFV owners to support their proposed facility use plans.

Specifically, sponsors may size the proposed VALE-funded fueling station so that the maximum intended airport use would consume 90 percent of the capacity of the station. No more than 10 percent of station capacity can be dedicated to public use. During the interim period between the operational start of the refueling and recharging station and the full 90-100 percent use of the station by airport AFVs, the sponsor may allow public access on a temporary basis up to the existing capacity of the station.

Public Access

VALE funding is intended primarily for airport operations and vehicles. However, the sponsor may grant limited public access to airport refueling and recharging stations supported by the VALE program under certain conditions. If public access to these facilities is granted, the sponsor must guarantee security and public safety. This includes locating the airport refueling or recharging station at a reasonable distance from the airport terminal and outside of the main airport security areas. In addition, the sponsor should certify public users and track their use of the facility. If public access is granted, sponsor and airport vehicles are entitled to priority use of the facility, especially in the event of fuel shortages or emergencies.

> ***Public access to refueling and recharging stations is allowed if security and public safety are guaranteed.***

Sponsors may wish to coordinate with other operators of AFV refueling or recharging stations (e.g., freight depots, van shuttle services) in the area. Although these fleets are not eligible for funding under the VALE program, an informal arrangement to assist each other in case of equipment failure or emergency can provide a useful back-up plan for airport operations.

Sponsors may be able to claim some of the emission reductions and AERCs from public use of airport refueling and recharging stations purchased with the assistance of the VALE program.

6.1.2 Gate Electrification

Similar to electric vehicles, electric powered infrastructure improvements are considered zero emissions under the program.

Gate electrification is the aircraft equivalent of vehicle idle emission reduction. Its purpose is to provide pre-conditioned air (PCA) and electrical power for aircraft parked at the gates. It reduces or eliminates the use of higher-emitting aircraft auxiliary power units (APUs) that use jet fuel and mobile ground generators that use diesel fuel.

Aircraft gate electrification projects include directly related upgrades to the power supply from the airport boundary to the terminal building, electrical improvements at aircraft gates, and power improvements within gate areas that provide electricity for aircraft auxiliary power and for GSE recharging.

For purposes of verification and compliance with VALE project tracking requirements, gate power and PCA projects must include the installation of meters that monitor and record electricity usage for each project gate and PCA unit.

6.1.3 Power Plants, HVAC Systems, and Generators

Airport sponsors may build or retrofit power plants and heating, ventilation, and air conditioning (HVAC) equipment located within the airport boundary if the proposed improvements use alternative fuels and result in cost effective airport emission reductions. Eligible power generation and HVAC systems, including emergency back-up power units, must be powered by eligible alternative fuels such as natural gas, solar photovoltaics[28], hydrogen fuel cells, wind power, and geothermal systems. Airport sponsors may also develop cogeneration facilities, which are eligible to the extent that they directly displace fuel use and provide electricity and hot water/steam to the airport for power, heating, and other essential functions.

[28] See FAA Airports 2010 solar guidance report, available from the Airports website.

6.1.4 Underground Fuel Hydrant Systems

Underground fuel hydrant systems deliver aviation fuels from the bulk storage tanks to aircraft gates. Construction and development of underground fuel hydrant systems within the airport boundary are eligible to the extent that the system directly reduces the number and use of fuel trucks at the airport.

6.1.5 Public Transit Projects at Airports

Airport projects that displace or remove vehicles from airport roadways, such as people mover systems, public transit lines (only sections at and within the airport boundary), and intermodal connection stations may qualify for VALE funding under the PFC program. PFC funds may be used to complement the main source of funding from other Federal transportation programs. The value of requesting PFC funding for transit-related projects through the VALE program is the opportunity for AERCs.

6.2 Non-Eligible Activities

Eligible infrastructure activities for the VALE program must be designed and implemented primarily for the purpose of reducing airport emissions. Among activities that are generally not eligible are projects that may reduce airport emissions but are designed primarily to meet other requirements, such as operating efficiency, public convenience, congestion mitigation, safety, and security (e.g., parking and cell phone lots, consolidated rental car facilities, automated vehicle management systems). Other projects that are not eligible are research-related projects and private revenue producing projects (e.g., fuel farms), unless specifically permitted under AIP, PFC, or VALE program guidelines.

6.3 Cost-Sharing Factors

If VALE funding is requested as part of a large airport improvement project, the FAA may only be able to participate on a limited basis. In addition to the basic program eligibility requirements (see Chapters 4, 6, 7, and 8), the FAA will consider the following cost-sharing factors for projects that are large, provide reasonable payback periods, or exceed recommended program cost effectiveness ranges:

- Is VALE funding critical to project feasibility or to the sponsor's ability to earn needed AERCs for CAA purposes?

- Is the VALE program enlisted early in the design process to confirm the emission reduction purpose of the project?

- Is the sponsor willing to increase its local cost share to assume a reasonable portion of risk?

- Is the sponsor willing to consider using its AIP entitlements as well as discretionary funding to underscore the importance of the project?

- What is the participation level of other organizations (e.g., Federal and State agencies, private firms, utilities)?

The level of VALE support may be subject to one or more of the following limitations:

- The portion of the project representing non-revenue producing public-use areas that are directly related to the movement of passengers and baggage[29]

- The portion of the project directly related to VALE equipment (e.g., the portion of terminal electrical system upgrades dedicated to a gate electrification project)

- The *incremental* cost of an alternative fuel system provided an equivalent conventional fuel system is an option. If no incremental cost comparison is applicable, funding may be limited to a "dollar per ton" limit based, for example, on the best cost effectiveness for ozone emission reductions.

Once VALE-eligible costs are determined, the standard AIP Federal cost share (see Table 7-3, Infrastructure Funding) is applied to establish the VALE project funding level.

6.4 Useful Life for Typical Airport Low-Emission Infrastructure

Table 6-1 provides average useful life data for typical infrastructure projects that can reduce airport emissions effectively. These data should be used to calculate VALE project emission reductions unless the table does not contain a needed equipment type or the sponsor can document more refined data to support modification of the information provided.

The average useful lives of certain types of stationary equipment and infrastructure projects can range from 13 to 40 years.[30]

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[29] AIP Handbook (Order 5100.38C), Section 601

[30] See EPA AERC Report: *Guidance on Airport Emission Reduction Credits for Early Measures through Voluntary Airport Low Emission Programs*, Section 6.2: Life of the AERCs, September 2004.

Table 6-1. Average Useful Life of Typical Airport Infrastructure

Category/Type	Average Useful Life (years)
Gate ground power/electrification	20
Gate pre-conditioned air unit (PCA)	13
Electric vehicle recharger	13
New CNG refueling station	30
Underground fuel hydrant system	40
People mover or transit connection	30
New boilers or HVAC system	20

6.5 Fuel Facility Guidelines

Fuel facility considerations for each major alternative fuel type are discussed in this section. Following this discussion, **Table 6-2** provides a summary that contains "fueling station footprint" data, for example, to compare the size of various alternative fuel stations with a conventional gasoline station.

6.5.1 Electric

Although electricity is considered an alternative fuel, it is technically not a fuel, but a pure energy source. Therefore, some considerations that apply to alternative fuels do not apply to electricity.

Fuel Availability: An electric charging station may be installed where access is available to the local electric utility power distribution system. Electric vehicle rechargers may place a burden on the airport's electrical system. Sponsors may consider using "bridge mounted interruptible power" to avoid the cost of upgrading the airport electrical system. These units prioritize power use for jet bridge movement over the rechargers. The limited movement of jet bridges provides nearly continuous power to the rechargers.

Fueling Station Footprint: Because no fuel needs to be stored, electric vehicle charging stations are much smaller than conventional gasoline/diesel fueling stations. The space required to park vehicles at the rechargers must be considered.

Fuel Storage and Special Handling Requirements: A variety of charging systems are available to best fit airport needs. Conventional charging systems offer the lowest cost option. These systems typically require 6 to 8 hours to charge a vehicle battery and may not be suitable for some busier airport operations. Some conventional chargers can be mounted on-board the vehicle. Vehicles are then plugged into standard outlets at common voltages, such as 120 or 208 volts.

Fast charging systems, in contrast, are capable of charging a large GSE battery from 20 percent to 80 percent of full charge in less than 2 hours. By "opportunity charging" during operator break periods, GSE can be operated continuously over several shifts without draining the battery to empty. These intelligent computer controlled systems extend battery life and store valuable vehicle operations data. Fast chargers automatically adjust the power they deliver to the battery to avoid over-charging and over-heating, which could cause damage. Installation costs are higher than for conventional chargers, as these systems typically require more electrical capacity.

A variety of vehicle connectors are also available. Conductive systems are the lowest cost and most common. These systems are based on the mating of metallic contacts. Inductive systems, in contrast, have no metal contacts, thereby providing an additional layer of operator safety. A paddle-like connector is inserted into a slot on the vehicle. Magnetic induction is used to transfer energy from the charging station to the vehicle.

6.5.2 Compressed Natural Gas (CNG)

Fuel Availability: A CNG fueling station may be located wherever there is local access to a natural gas distribution or transmission system. The expense of extending the underground gas piping system significant distances may be a consideration.

Fuel Storage: CNG is stored above ground in high-pressure steel vessels. This significantly increases the footprint of fueling stations that use storage banks.

Fueling Station Footprint: Generally speaking, there are three approaches to fueling compressed gas into vehicles. Each has different footprint characteristics, and each is discussed separately below.

The first CNG method, *Time-Fill*, requires that a vehicle remain connected to the dispenser for a period of hours. This is a very economical and small footprint approach that can be integrated into a vehicle storage facility or yard. In a typical application, vehicles are active during the day and then return to a central facility at night. A small, inexpensive compressor system is used to compress the natural gas onto the vehicle over several hours.

The second method, *Cascade Fast-Fill*, allows a vehicle to be fueled within a few minutes, similar to gasoline or diesel fueling. To do this, the gas is compressed and stored in high-pressure steel tanks located at the fueling station. Because the gas must be pressurized and stored on site, these stations are typically significantly larger in size, more complex, and more expensive to design and construct than a conventional gasoline or diesel fueling station. In a typical application, vehicles are fueled in high volume at peak times from the high-pressure storage tanks. When the peak period is over, the compressor runs continuously for a period of time to return the storage tanks to maximum pressure and then shuts down. This approach is not suitable for continuous, high-volume fueling.

The third method, *Buffered Fast-Fill*, is also very fast, and also supports continuous, high-volume fueling for fleets of heavy duty vehicles such as transit buses. Because buffered fast-fill systems use even larger and more powerful compressors, they are the largest and most complex of all natural gas fueling stations.

Special Handling Requirements: Despite misperceptions to the contrary, natural gas is actually a safer fuel than gasoline because it is difficult to ignite (ignition temperature is about 1,100 ^{0}F) and is lighter than air. Leaks do not pool beneath a vehicle as gasoline leaks do. Natural gas is non-toxic. The greatest safety concern with CNG is that the gas is stored at high pressure capable of projecting fittings and couplings at high velocity. Drivers can be trained to fuel their own vehicles safely.

6.5.3 Liquefied Natural Gas (LNG)

Fuel Availability: LNG is normally supplied by delivery trucks so LNG fueling stations may be located where there is sufficient roadway access.

Above or Below Ground Storage: LNG is usually stored above ground in cryogenic tanks. However, LNG tanks may also be stored below grade in an open pit.

Fueling Station Footprint: LNG has a significantly greater energy density than natural gas at atmospheric pressure, but it is still lower in energy density than gasoline, requiring about 50 percent more volume than gasoline for a similar amount of energy. Because LNG is denser than CNG and does not need to be compressed, LNG stations require less area than CNG stations. Nevertheless, LNG fueling station footprints are usually larger than footprints of conventional gasoline stations. The use of vertical LNG storage tanks can reduce real estate requirements.

Special Handling Requirements: Because LNG is a cryogenic liquid, it requires additional emergency and safety considerations, including the use of special fittings and protective clothing. Vehicle fueling is usually performed by a trained technician.

6.5.4 Liquefied Petroleum Gas (LPG or Propane)

Fuel Availability: LPG is supplied by delivery trucks so fueling stations should be located where there is roadway access.

Fuel Storage: LPG is stored above ground in low-pressure steel tanks.

Fueling Station Footprint: LPG contains more energy per unit of volume than natural gas at atmospheric pressure, but it is still less energy dense than gasoline, requiring about 33 percent more volume than gasoline for a similar amount of energy. Since LPG is a liquid fuel at low pressure, the station footprint is slightly larger than gasoline/diesel stations, mostly as a result of the need to store propane above ground. A skid-mounted system equipped with a vertical tank and dispenser requires about the same or less real estate as the retail propane dispensers found at many retail gasoline stations.

Special Handling Requirements: Because LPG is heavier than air, leaks may pool beneath a vehicle. Propane is non-toxic. Drivers can be trained to fuel vehicles safely.

6.5.5 Ethanol (E85)/Methanol (M85)

Fuel Availability: E85 is supplied by delivery truck. Distribution is limited but growing outside of the Midwest. M85 is not currently commercially available.

Fuel Storage: Below ground storage is common.

Fueling Station Footprint: The fueling station footprint would be the same as for conventional gasoline or diesel fueling facilities.

Special Handling Requirements: The dispensing technique of these fuels is similar to that for gasoline. Because of the corrosive solvent nature of ethanol and methanol, contact with skin and other materials should be avoided.

6.5.6 Hydrogen

Fuel Availability: At present, there is no underground pipeline system for hydrogen. Liquid hydrogen is currently distributed over the road by industrial gas vendors. Alternatively, hydrogen may be produced on-site by a variety of methods, which include steam reforming of natural gas and electrolysis. Where natural gas is reformed, access to the natural gas distribution or transmission system is necessary.

Fuel Storage: Compressed hydrogen is stored above ground in high-pressure steel tanks. Liquid hydrogen is stored above ground in cryogenic vessels.

Fueling Station Footprint: On-site production of hydrogen by electrolysis or reforming increases the overall footprint of a hydrogen fueling station. The amount of equipment required to generate hydrogen fuel and store it makes hydrogen fueling stations real estate intensive.

Special Handling Requirements: Even at 10,000 psi, hydrogen contains only two-thirds the energy, by volume, of CNG at 3,000 psi. To achieve viable performance, vehicles will need to store hydrogen on board at pressures ranging from 5,000 to 10,000 psi, posing significant technical and safety challenges.

6.5.7 Biodiesel (B85-B100)

Fuel Availability: Biodiesel is delivered via truck. Distribution is limited but growing.

Fuel Storage: Storage is the same as for conventional diesel fuel.

Fueling Station Footprint: With modest preparation, existing diesel fueling facilities may be used.

Special Handling Requirements: Handling requirements for biodiesel are generally the same as for diesel fuel. However, biodiesel may require special additives or tank heating in cold climates to prevent gelling. Existing diesel tanks must be properly cleaned and retrofitted with solvent-resistant fittings and gaskets prior to the introduction of biodiesel. Dispensing of biodiesel is the same as for diesel fuel.

Table 6-2. Fueling Station Considerations

Alternative Fuel	Fuel Availability	Fuel Storage	Fueling Station Footprint *(compared to gasoline)*	Gaseous vs. Liquid	Special Handling Considerations
Electric	Electrical Distribution System	N/A	Smaller	N/A	Inductive vs. Conductive
Compressed Natural Gas (CNG)	Underground Pipeline	Above Ground	Smaller to Largest	Gaseous	High Pressure
Liquefied Natural Gas (LNG	Delivery Truck	Above Ground	Larger	Liquid	Cryogenic
Hybrid Electric (Gasoline)	Delivery Truck	Below Ground	Same	Liquid	N/A
Hybrid Electric (Diesel)	Delivery Truck	Below Ground	Same	Liquid	N/A
Propane (LPG)	Delivery Truck	Above Ground	Smaller	Liquid	Heavier than Air
Ethanol (E85)	Delivery Truck	Below Ground	Same	Liquid	Avoid Skin Contact
Methanol (M85)	Delivery Truck	Below Ground	Same	Liquid	Avoid Skin Contact
Hydrogen	Underground Pipeline	Above Ground	Largest	Gaseous	High Pressure
Biodiesel (B85-B100)	Delivery Truck	Above or Below Ground	Same	Liquid	Cold Weather

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CHAPTER 7
AIP AND PFC PROJECT ELIGIBILITY

While most VALE program requirements are the same regardless of FAA funding, several eligibility factors depend on whether a project is funded through the Airport Improvement Program (AIP) or by Passenger Facility Charges (PFCs). It is important to consider these funding-related factors on all VALE projects, especially with regard to vehicle acquisition.

Project eligibility for the PFC program is broader traditionally in comparison to AIP eligibility. AIP grants-in-aid are funded through the Federal Airport and Airway Trust Fund, while the revenue-based PFC program is funded by passenger airline ticket fees collected at the time of purchase. Because PFC revenues are considered local revenues, sponsors generally have more flexibility in the use of PFC revenues than AIP grants. This is true in the VALE program also.

The major differences in VALE project eligibility between the AIP and PFC program are discussed in this chapter, including the use of alternative vs. conventional fuels, ownership of equipment, and funding timelines for project approval. Also, information on airport leases and enforceable agreements is presented and how these agreements are used in the management and financing of VALE projects.

7.1 Funding

The VALE program expands traditional AIP and PFC eligibility guidelines and enables earlier airport planning and implementation of low-emission projects. Because VALE projects are considered an eligible activity within AIP and the PFC program, there is no separate or dedicated VALE program budget. VALE projects are approved and funded on a case-by-case basis according to the project's relative importance in relation to other eligible airport activities.

7.1.1 AIP Funding

VALE projects must adhere to all AIP rules and procedures contained in the AIP Handbook (FAA Order 5100.38C), and standard grant assurances (e.g., competitive bidding, buy American, use of airport revenues).[31] The VALE Technical Report is considered supplemental guidance to the AIP Handbook for purposes of administering the VALE program.

[31] See FAA Order 5190.6B, *Airport Compliance Manual,* for detailed information about AIP standard assurances.

Sponsors may fund VALE projects through AIP entitlements or through the discretionary portion of the AIP budget, including the so-called "noise and air quality set-aside".[32] The set-aside offers greater opportunity for VALE funding because only noise and air quality projects are eligible for this portion of the AIP budget. VALE projects funded through the noise and air quality set-aside do not affect airport entitlements.

Reimbursable costs for VALE AIP grants must conform to all AIP guidelines. Eligible AIP costs include those for project formulation and allowable capital equipment.

Ineligible AIP costs include O&M costs (e.g., fuel), planning studies, public information, training, and project tracking and record-keeping. In addition, sponsors may not use AIP or PFC funds to pay for EPA, State, district, local, or Tribal reviews of VALE projects or AERC actions.

7.1.2 AIP Matching Funds

Eligible sources for local matching funds are defined under current AIP guidelines (see FAA Order 5100.38C). These sources include eligible airport revenues and State or local grants that do not include other Federal funds.

Vehicle base costs cannot be counted as part of the AIP local match.

Sponsors may also use PFC revenues to fulfill local matching AIP requirements. Any use of PFCs by the sponsor as a local match for AIP projects means that the AIP grant assurances and compliance are extended to these PFC funds as well. It is important to emphasize that the base cost of a vehicle cannot be counted as part of the sponsor's local matching requirements.

Consistent with AIP procedures, sponsors are expected to finance their VALE project in advance of AIP reimbursement for the allowable Federal cost share (see **Table 7-3** below).

[32] The VALE program under Vision 100 expanded the existing AIP eligibility for low-emission projects (§47102(3)(F)). The so-called "traditional" AIP eligibility applies when a proposed project to reduce emissions is not "surplus" (See Chapter 1 Section 1.5 and AERC Report Section 3.2) because of an existing commitment to airport emission reductions in support of the CAA (e.g., MOUs or EIS mitigation measures). Sponsors are encouraged to contact the FAA to discuss VALE vs. traditional AIP eligibility.

7.1.3 PFC Funding

FAA management of the PFC program generally follows AIP rules and procedures unless differentiated by legislation or by agency PFC regulations and orders. Similarly, PFC eligibility requirements for the VALE program adhere to AIP guidance unless otherwise specified in this report.

While the FAA manages and oversees the PFC program, sponsors are granted local authority to collect and use PFC revenues on approved projects.[33] Because PFCs are considered local airport revenues, they can be used to finance 100 percent of eligible project costs and do not require a local match.

Similar to the AIP, sponsors participating in the VALE program using PFC funds must adhere to the established general eligibility requirements and procedures of the PFC program. Such participation may require sponsors to finance VALE projects initially from existing airport revenues prior to approved cost reimbursement of PFC funds.

7.2 Timelines

The AIP and PFC program funding timelines, which differ substantially with regard to the fiscal year, review periods, and other requirements, are described below.

7.2.1 AIP Funding Timeline

VALE applications for AIP funding should follow the FAA Airport Capital Improvement Program (ACIP) timetable for AIP planning and programming (see **Table 7-1)**. Based on this timetable, the best time for a sponsor to submit a VALE application to the FAA and State air quality agency is in the spring prior to the fiscal year in which AIP funding is sought. By meeting this schedule, the sponsor can expect AIP approval of its proposed VALE project in the December-February timeframe of the new fiscal year, which begins October 1.

It is important to note that State air quality agencies have a 45-day approval period to review a VALE application and to provide a required AERC Letter of Assurance to the FAA (see AERC Report). Sponsors should incorporate this State review period into their project planning and application development so that their VALE applications coincide with AIP annual programming.

[33] Airport "sponsors" are planning agencies, public agencies, or private airport owners/operators that have the legal and financial ability to carry out the requirements of the AIP program. With regard to the PFC program, airport sponsors are restricted to "public agencies."

Table 7-1. General Timeline of the AIP Funding Approval Process

Period	Action
Spring Previous FY	Office of Airport Planning and Programming, Financial Assistance Division (APP-500) submits ACIP guidance memorandum to FAA regions
Summer Previous FY	FAA regions submit 3-year ACIP to Airports AIP Branch (APP-520)
Summer Previous FY	APP-520 performs national review of regional ACIPs and coordinates corrections with regional offices
Summer Previous FY	APP-520 performs national analysis to create national priority rating thresholds (final candidate list is determined)
Fall Current FY	Regional offices submit proposals to add/delete projects to/from the final candidate list
Fall Current FY	APP-520 prepares and submits regional budgets to regional offices
Fall Current FY	Regional offices recommend funding plans and submit plans to APP-520
Winter Current FY	Associate Administrator for Airports (ARP-1) selects/approves projects for implementation of regional programming actions
Spring/Summer Current FY	Unfunded candidate list projects will be considered as priority projects to receive any remaining converted "carryover" funding

7.2.2 PFC Funding Timeline

Sponsors (i.e., public agencies for PFCs) have no fiscal year filing deadlines for PFC applications and may apply at any time based on project plans. However, it should be noted that PFC-funded VALE activities that are combined with annual AIP funding may need to be organized on a fiscal year basis.

To assist sponsors in coordinating their VALE application submittals, a general outline of the PFC planning and programming timeline is presented below in **Table 7-2**. This process requires the sponsor to meet several statutory deadlines, including some prior to submitting a VALE project application to the FAA.

Table 7-2. General Timeline of the PFC Funding Approval Process for Use

<table>
<tr><th>Duration in Days</th><th colspan="3">Action</th></tr>
<tr><td></td><td colspan="3">Public agency develops PFC application data for VALE project(s) and notifies carriers of pending application, projects, financing, and timeframes.</td></tr>
<tr><td>30-45</td><td colspan="3">Public agency schedules consultation meeting with carriers and publishes a notice in the local newspaper.</td></tr>
<tr><td>30</td><td colspan="3">Carriers have 30 days following consultation meeting to respond in writing. Upon receipt of carrier comments, public agency completes and submits application to the FAA.</td></tr>
<tr><td>120</td><td><u>HUB AIRPORTS*</u>

Upon receipt of completed PFC application, the FAA has 30 days to review the application for completeness.

If the application is found to be substantially complete, the 120 day FAA statutory review timeframe continues from the receipt date.

If the application is not found to be substantially complete, the 120-day clock is suspended until the public agency submits supplemental information, at which time the clock resets to 120 days. The public agency has the option to not supplement the application, in which case the 120-day clock continues from the submittal date and the FAA has to issue a decision.

During the 120-day review period, the FAA completes a full review and issues a decision on the PFC application.</td><td>30</td><td><u>NON-HUB AIRPORTS</u>

Upon receipt of completed PFC application, the FAA has 30 days to review and issue a decision on the PFC application.</td></tr>
<tr><td>180-195</td><td>CUMULATIVE DAYS FOLLOWING PFC APPLICATION DEVELOPMENT.</td><td>90-105</td><td>CUMULATIVE DAYS FOLLOWING PFC APPLICATION DEVELOPMENT.</td></tr>
</table>

* Hub airports are commercial service airports with at least 0.05 percent of U.S. passengers (FAA Order 5100.38C, Chapter 1, Table 3, Definition of Airport Categories.

7.3 Fuels

Eligible new vehicles and fuel systems funded under the AIP may only be powered by alternative fuels (including hybrid systems) as defined by the DOE (see Chapter 3). In comparison, eligible vehicles and equipment funded under the PFC program may use clean conventional fuels (e.g., ULSD fuel or super efficient gasoline engines) in addition to alternative fuels, provided that all new vehicle applications meet VALE program low-emission standards.

Retrofitting existing vehicles with verified alternative fuel systems to achieve lower emissions is currently eligible under both AIP and PFC programs (see Chapter 4).

7.4 Ownership

Another major variable in AIP and PFC program eligibility is airport ownership of low-emission vehicles and equipment. Under the AIP, all vehicles and equipment must be airport-owned. The PFC program is similar but also allows sponsors to assist in the purchase of tenant-owned airport vehicles and supporting equipment. Regardless of who owns VALE-funded vehicles and equipment or the FAA funding source (AIP and/or PFCs), sponsors are responsible for meeting all VALE program requirements and special conditions (see Chapter 8 and **Appendix C**).

7.4.1 AIP Ownership Requirements

New vehicles and equipment purchased through the AIP must be airport-owned. AIP funding cannot be used to help purchase new tenant-owned vehicles or equipment (e.g., airline GSE). It is permissible, however, for sponsors to lease VALE vehicles and equipment purchased under AIP to airport tenants (see "Lease Agreements for Program Vehicles and Equipment" below). Under AIP funding, sponsors must hold title to all VALE vehicles and equipment until they have outlived their useful lives. Sponsors may not sell or transfer title to program vehicles and equipment without prior notification to and approval by the FAA.

All new vehicles and equipment purchased with AIP funds must be owned by the sponsor.

Table 7-3. Comparison of AIP and PFC Program Eligibility

<table>
<tr><th colspan="2">VALE Program Elements</th><th>AIP</th><th>PFC</th></tr>
<tr><td rowspan="7">Vehicles</td><td rowspan="2">Eligible Vehicles</td><td colspan="2">Airport-dedicated on-road and non-road vehicles</td></tr>
<tr><td colspan="2">New vehicles and retrofits</td></tr>
<tr><td rowspan="2">Program Criteria</td><td>• Airport-owned or leased</td><td>• Airport-owned or leased, or tenant-owned with enforceable agreement</td></tr>
<tr><td colspan="2">Must remain at airport for useful life
New vehicles must be certified to meet program low-emission vehicle standards
Must be monitored and tracked
Must be labeled with VALE program logo
Must replace equipment with low-emission equivalent</td></tr>
<tr><td>New Vehicle Funding</td><td>• 75% <u>incremental</u> cost for large and medium hub airports
• 95% <u>incremental</u> cost for smaller commercial service airports</td><td>• 100% <u>incremental</u> cost
• May be used as AIP matching funds</td></tr>
<tr><td>Retrofit Funding</td><td colspan="2">Full cost of retrofit technology for existing airport vehicles</td></tr>
<tr><td>Funding Limitations</td><td colspan="2">No base vehicles costs
No O&M costs including fuel</td></tr>
<tr><td rowspan="4">Infrastructure</td><td>Eligible Infrastructure</td><td colspan="2">Eligible infrastructure project must contribute directly to airport emission reductions. Examples:
- AFV refueling and recharging stations
- Aircraft gate electrification
- Power plant, generator, and HVAC conversions to cleaner alternative fuels</td></tr>
<tr><td rowspan="2">Program Criteria</td><td>• Airport-owned or leased</td><td>• Airport-owned or leased, or tenant-owned recharging and refueling equip. with enforceable agreement</td></tr>
<tr><td colspan="2">Must be labeled with VALE identification logo
Cannot extend beyond airport boundary
Limited public access to refueling and recharging stations if airport safety and security are guaranteed and if airport sponsors and vehicles have priority use</td></tr>
<tr><td>Funding</td><td>• 75% cost for large and medium hub airports
• 95% cost for smaller commercial service airports</td><td>• 100% cost
• May be used as AIP matching funds</td></tr>
<tr><td rowspan="2">Fuels</td><td>Eligible Alternative Fuels</td><td colspan="2">Electricity
CNG, LNG,LPG
Blended fuels 85 percent or greater such as E85, M85, and biodiesel (B85-100)
Hydrogen
Coal-derived liquid fuels
P-series fuels
Hybrid technology</td></tr>
<tr><td>Program Criteria</td><td>• Must operate exclusively on alternative fuels that are substantially non-petroleum based and domestically produced</td><td>• May operate on alternative fuels, blended fuels, or clean conventional fuels provided that applicable program low-emission standards are met</td></tr>
</table>

7.4.2 PFC Ownership Requirements

PFC eligibility extends beyond airport ownership and leasing to non-airport owned vehicles including airline-owned GSE. [34] This PFC allowance is important to the low-emission goals of the VALE program because airlines own and operate approximately 75 percent of the GSE at domestic airports. Owners of the other 25 percent of GSE are primarily cargo handlers, fixed based operators (FBOs), and other third party operators.

Tenant-owned infrastructure or equipment that is PFC-eligible includes stand-alone recharging and refueling stations that support low-emission program vehicles. Low-emission infrastructure or equipment that must be airport-owned if purchased with PFCs includes gate power equipment, underground fuel hydrant systems, building HVAC systems, and stand-alone power generating facilities.

7.4.3 Combined Project Funding and Ownership

Projects that combine AIP and PFC funding or that mix airport-owned and tenant-owned vehicles and equipment are permitted under the VALE program, provided that:

1) The sponsor verifies that all aspects of the project meet all AIP grant assurances and PFC program requirements, notwithstanding the differences in project eligibility described in this report.
2) The sponsor takes responsibility for successfully managing all VALE program requirements and special conditions whether the vehicles and equipment are airport-owned or tenant-owned.
3) The sponsor executes enforceable agreements with tenants that cover airport-leased or tenant-owned vehicles and equipment (see below).

<u>Example 1:</u> The sponsor wants to combine AIP and PFC funding to purchase new CNG buses and to upgrade an existing CNG refueling station.

In this example, the CNG vehicles and refueling station are airport-owned and leased by the sponsor to two companies, one operating the buses and the other operating the refueling station. AIP funding is used for the vehicles while PFC funding is used for the station upgrade. As long as the two lease agreements are FAA approved, there is no problem combining AIP and PFC funding for this project.

[34] PFC "approvals" include "acknowledgments" under *Vision 100*.

Example 2: The sponsor wants to use AIP funding to buy new rechargers in combination with an airline that wants to operate electric GSE.

In this example, AIP funding may be used to pay for new recharging stations even if the project emission savings and cost-effectiveness depend on new tenant-owned vehicles that may or may not involve the use of PFC funds to offset incremental vehicle costs. Tenant stipulations are as follows:

1) The airline must purchase new electric GSE and provide the sponsor and the FAA with manufacturer specifications for the proposed vehicles.[35]
2) The airline must purchase the number of compatible electric GSE that match the capacity of the recharger(s).
3) The airline must sign an enforceable agreement with the sponsor that addresses all VALE program requirements and special conditions (see below). The agreement must include an airline commitment to provide the sponsor with vehicle usage information on a regular schedule to meet the sponsor's project tracking responsibilities.

7.5 Enforceable Agreements

Enforceable agreements between the sponsor and the tenant are discussed in this section. Airport leases and other agreements discussed below should be reviewed by the FAA Region prior to the sponsor's signing. (As discussed in Chapter 2, a signed agreement or letter of assurance from the participating tenant stating that the tenant will abide by all VALE special conditions must be included in Appendix D of the VALE application prior to FAA funding approval).

[35] Used tenant-owned electric GSE, even if deemed "surplus" from an emissions standpoint, cannot be applied to the VALE project in this example because of mixed funding sources and the possibility that the FAA long-term investment in new rechargers could be affected by the shorter useful life of used vehicles.

7.5.1 Lease Agreements for Program Vehicles and Equipment

Sponsors are allowed to lease VALE-funded vehicles and equipment for use by airport tenants. For example, sponsors may lease electric GSE and recharging equipment to an air carrier or lease the operation of a CNG refueling station to a fuel provider.[36]

VALE program goals must be reflected in project lease arrangements, especially the requirement to keep VALE vehicles and equipment at the airport to ensure CAA and AERC *permanent* emission reductions.

The sponsor should structure the lease as simply as possible for efficient project oversight and compliance. The criteria for a qualified lease arrangement include:

- A term that reflects the useful life of project vehicles or equipment (e.g., 13 years or 156 months for an electric bag tug). This period ensures that project emission reductions are permanent over the life of the project and that AERCs will be fully available to the sponsor.

- Rental charges for non-AIP/PFC expenses (e.g., base vehicle costs) should be amortized over the useful life of the project to keep rental costs at or below market rates.[37] Such amortization provides a financial incentive to tenants/lessees in addition to other possible project funding for infrastructure improvements.

- Restrictions on modifying the lease except under the following circumstances:

    1. The tenant ceases operations at the airport, or

    2. The tenant demonstrates a significant reduction in VALE-related operations with clear data and documentation

  The FAA must approve all requests for lease modifications. Sponsors are expected to forward the request and documentation to the FAA ADO and FAA Region for their review and approval prior to the modification.

  <u>Example</u>. The sponsor leases electric GSE to an air carrier to support scheduled operations and the air carrier subsequently seeks to reduce the

[36] The sponsor should consult with the FAA ADO or Region Office if a VALE project proposal includes a lease agreement or tenant-owned vehicles or equipment. Regarding active lease agreements in a VALE project, proposed modifications to the required structure of the lease must be reviewed and approved by FAA ADO and Region.

[37] The sponsor cannot amortize by lease any portion of the vehicle, equipment, or facility cost that is paid for with AIP or PFC funding.

number of GSE in the lease. In this case, the request for lease modification requires:

- A demonstration by the air carrier that GSE operations have been or will be reduced during the remaining years of the lease. Evidence to support the request must include a revised schedule in the Official Airline Guide (OAG) or a signed agreement with the sponsor for reduced aircraft gate use.

- Certification by the air carrier that all similar types of GSE have been or will be removed from the airport first, beginning with conventionally fueled GSE and then non-VALE alternative fuel GSE.

With regard to a lease for managing and operating an airport refueling or recharging station, the sponsor must include the following provisions in the lease:

- The facility complies with all airport safety and security standards, including the safe handling and transportation of alternative fuels.

- The facility guarantees that the sponsor and airport-owned vehicles will have priority regarding facility use and fueling in all cases, including periods of high demand or in the event of fuel shortages. Public access to the facility cannot impede the use of the facility for airport needs and the efficient delivery of airport services.

- The facility may offer limited public access, as approved by the sponsor.

- The facility may co-locate non-VALE equipment, as approved by the sponsor.

For all leases, the sponsor should clearly specify the range of options in the event of a violation or default on the lease (e.g., total rent due, penalties, immediate possession, legal remedies). Accordingly, the FAA reserves the right to recover funding provided through the AIP and the PFC program for VALE acquisitions.

In the event of a lease modification or default, the sponsor is also responsible for adjusting its actual or estimated project emission reductions and communicating this information to the FAA, EPA, and State air quality agency as soon as possible.

7.5.2 Agreements for Tenant-Owned Vehicles and Equipment

The sponsor must establish an enforceable agreement with the tenant or purchasing party when non-airport owned vehicles and equipment are part of a proposed VALE project. This agreement is required to meet the special conditions of the VALE program (see Chapter 8 and **Appendix C**), as well as the PFC determination paragraph or acknowledgement letter in PFC approvals.

This agreement should include actions that the sponsor and the airport tenant will take in the event that the tenant is unable to fulfill the special conditions of the VALE program for any reason. Tenants have two basic options:

1. The tenant may sell its VALE program-funded or committed vehicles and equipment to the sponsor or to another tenant at the same airport with approval of the sponsor. New tenant owners must likewise accept and abide by the special conditions of the program.

2. The tenant may reimburse the FAA and the sponsor for AIP or PFC funds used to purchase project vehicles and equipment. Whether tenant-owned project vehicles and equipment are PFC-supported or not, the tenant obligation extends beyond its own vehicles and equipment to other system equipment purchased as part of the VALE project. For example, if a tenant removes electric GSE that are supported by an AIP-funded recharging station, the tenant is responsible for reimbursing the FAA for the remaining useful life of the recharger. The sponsor and the FAA shall determine the appropriate level of reimbursement for related AIP and PFC project investments.[38]

The tenant must notify the sponsor and the FAA prior to taking action on either option. Regardless of the option selected, if the tenant moves, sells, or disposes of VALE program-funded vehicles, the sponsor is responsible for adjusting its actual or estimated program emission reductions and communicating this information to the FAA, EPA, and State air quality agency as soon as possible.

[38] Depreciation and other cost factors may be considered by the FAA. The sponsor must deposit any PFC reimbursement in the sponsor's PFC account for use on other PFC-eligible projects.

CHAPTER 8
AIRPORT PROGRAM RESPONSIBILITIES

Sponsors that participate in the VALE program must adhere to standard AIP and PFC conditions and assurances.[39] In addition, the VALE program includes several "special conditions" for sponsors (see **Appendix C**), including the requirement that program vehicles and equipment must be airport-dedicated and remain at the airport throughout their useful lives. The sponsor is also responsible for labeling, tracking, and maintaining all of the low-emission vehicles and equipment purchased under the VALE program.

FAA Regional Airports Division Offices and Airports District Offices oversee VALE projects by monitoring grant assurances and conducting periodic on-site inspections. The Airports Financial Assistance Division (APP-500) at FAA Headquarters monitors project activity and ensures that grant funds are expended in a timely manner for the appropriate purpose.

The FAA may impose sanctions if a sponsor fails to comply with AIP grant assurances or program requirements as described in FAA Order 5100.38C, AIP Handbook, Chapter 11, Section 6 on "Suspension and Termination of the Grant." If vehicles are removed from the airport or are not used as prescribed, a "Termination for Cause" will become effective and the sponsor will be required to reimburse the FAA for related grant funds and make appropriate revisions to its project emission reduction estimates. In addition, if circumstances arise after the grant funds have been authorized and/or distributed that prevent the sponsor from continuing or completing the commitments of the VALE program, the FAA may issue a "Termination for Convenience" by which the sponsor is required to return unspent grant funds to the FAA, thereby voiding project commitments and related AERCs.

The four "special conditions" for sponsors participating in the VALE program are discussed below. Using language provided in **Appendix C**, the FAA will insert these conditions into AIP grants and PFC approvals for the VALE program. With acceptance of funding, sponsors agree to fulfill these special conditions for the VALE program, as well as the standard assurances, to ensure ongoing program compliance. In addition, the sponsor should acknowledge the special conditions and requirements of the VALE program in all sponsor-tenant agreements and leases involving program vehicles and equipment.

[39] See the AIP Handbook (FAA Order 5100.38) and Airport Compliance Manual (FAA Order 5190.6B) for more information about standard assurances.

8.1 Vehicles to Remain at Airport for Useful Life

In accordance with the CAA, the low-emission benefits of the VALE program for the airport and surrounding area must be permanent. Therefore, the sponsor must certify to the FAA that vehicles and other assets acquired or contracted through the VALE program will remain in operation at the airport for their useful lives. Program vehicles or equipment may not be transferred to, taken to, or used at another airport without the consent of the FAA in consultation with the EPA and State air quality agency.

The sponsor must also certify as practicable that any vehicles or equipment replaced under the program, whether airport or privately owned, will not be transferred to another airport or location within the same or any other nonattainment or maintenance area. This requirement protects regional air quality, avoids adverse effects on other sensitive locations, and prevents the possibility of duplication of VALE program funding for the same vehicles or equipment at other airports.

In the event that the sponsor uses VALE program funding to assist a tenant or third-party, the sponsor shall enter into an enforceable agreement with this party to ensure that all project vehicles and equipment remain at the airport for their useful lives. The agreement should specify the steps that would be taken by the tenant to re-sell vehicles or equipment or to reimburse the FAA if VALE-funded, tenant-owned vehicles and equipment are removed or abandoned, including some or all of associated project costs for refueling and recharging stations.

8.2 Equipment Labeling

All vehicles and equipment that are acquired or upgraded as part of the VALE program, including vehicles and equipment that are non-airport owned such as airline GSE must be clearly labeled with the VALE program logo (see **Figure 8-1**). The main purpose of labeling is to enable easier identification and tracking of VALE vehicles and equipment and to ensure that vehicle use is airport-dedicated. The VALE label also provides a visible reminder of the agency's commitment to low-emission airport technology.

Manufacturing of the labels is the responsibility of the airport sponsor or participating airport parties and is an eligible project cost. The size of the rectangular VALE program label must be a minimum of 11 inches (horizontal) by 6 inches (vertical) so as to be clearly legible at 50 feet. An acceptable high-resolution graphic is provided on the FAA VALE website: http://www.faa.gov/airports/environmental/vale.

Figure 8-1. Label for VALE Program-Funded Vehicles and Equipment

8.3 Tracking and Monitoring Requirements

The sponsor is responsible for the tracking and monitoring of all vehicles and equipment at the airport that are acquired or upgraded under the VALE program, including vehicles that are non-airport owned such as airline GSE. Tracking and monitoring of vehicles and equipment are necessary for identification purposes and for improving the accuracy of estimated emission reductions.

The sponsor must keep detailed annual records of VALE vehicles and equipment and must maintain these records so that they are readily available for FAA inspection, public review, or auditing. In addition, the sponsor has an affirmative responsibility to notify the FAA in writing as early as possible of major changes to VALE vehicles and equipment or their use.

Airport sponsors are required to monitor the usage of all vehicles acquired through the VALE program and to keep up-to-date usage records.

To standardize the monitoring process, the FAA recommends using the project tracking worksheets provided in **Appendix E** and available electronically from the VALE website. Airport identification and use records for project vehicles and equipment must include ownership, confirmation of program labeling, and individual identifiers, such as make, model, and vehicle identification numbers (VINs/serial numbers). Annual use data should be collected and maintained by individual vehicle or piece of equipment, as well as at an aggregate level by vehicle/equipment type and ownership. Vehicle use is typically estimated or measured by annual hours of operation, fuel use, and/or miles traveled. Additional information must include financial records, including the dates of vehicle and equipment orders, deployment, and major maintenance or repair.

The sponsor must also maintain annual emissions data by criteria pollutant (in tons/year). This information is important for purposes of ongoing cost effectiveness calculations and AERC verification with State air quality agencies and the EPA. The sponsor must provide current/updated emission reduction estimates to its State air quality agency, the EPA, and the FAA at three different times:

1) When applying for the program.
2) When applying to the State air quality agency for issuance of AERCs during or following project implementation.
3) When using the AERCs to meet regulatory requirements.

Project information should be readily available if requested because the sponsor must maintain annual usage records, including the remaining estimated useful life of vehicles and equipment. Updated emission reduction estimates should be based on as much actual and historical information as possible. If local resources permit, sponsors are encouraged to partner with vehicle and engine manufacturers, universities, and industry to monitor vehicle emissions, which would supplement emission estimates obtained from certification data, manufacturer specifications, or computer models.

8.4 Replacement of Low-Emission Vehicles and Equipment for the Useful Life of the Project and AERCs

In the event that VALE vehicles or equipment are disabled before the end of their useful lives (e.g., accidents or breakdowns), the sponsor agrees to replace such vehicles or equipment with equivalent units that produce equal or lower levels of emissions. The financial responsibility for vehicle or equipment replacement under these circumstances is with the sponsor. While replacement vehicles may be eligible for AIP or PFC funding, the FAA offers no guarantee that further funding will be available or approved in the future to meet the sponsor's commitment regarding replacement of these vehicles.

The agreement discussed above assures that actual emission reductions from the VALE program are consistent with the underlying emission reduction estimates used for granting AERCs.[40] This consistency fulfills CAA requirements by ensuring that VALE benefits for the airport and surrounding area are *permanent* for the duration of the AERCs.

The sponsor may commit to replacing vehicles and equipment with useful lives of less than 20 years with equivalent or cleaner technology. This "option" allows the sponsor to obtain AERCs for an extended period of up to 20 years. The sponsor must elect the option in the VALE project application (see **Appendix D**, Project Application

[40] See EPA *Guidance of Airport Emission Reduction Credits for Early Measures through Voluntary Airport Low Emission Programs,* Chapter 6, Section 6.2, "Life of the AERCs", 2004.

Worksheet, page 1).[41] Moreover, this decision must be reflected in the emission reduction calculations at the time the proposal is submitted to the State air quality agency.

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[41] Stationary equipment with a longer useful life than 20 years may be eligible for AERCs up to 40 years. See EPA *Guidance of Airport Emission Reduction Credits for Early Measures through Voluntary Airport Low Emission Programs,* Chapter 6, Section 6.2, "Life of the AERCs", 2004.

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Chapter 9
ASSESSMENT METHODOLOGY

This chapter discusses the required methodology for quantifying project emission reductions, using AERCs, and determining project cost effectiveness. The discussion includes data development for EDMS modeling and the presentation of EDMS project emission results to the FAA, EPA, and State air quality agencies.

9.1 Baseline and Project Conditions

The sponsor's analysis for VALE projects is limited in scope to specific information about the proposed low-emission project. The sponsor is not required to conduct an analysis or inventory of non-project or total airport emissions.

The emissions assessment for the project application must be conducted using the latest version of the FAA Emissions and Dispersion Modeling System (EDMS) and VALE Project Application Worksheets (see **Appendix D**). The most recent versions of these documents are available on the VALE website.[42]

The sponsor only needs to evaluate VALE project emissions. Inventory of airport emission sources unrelated to the VALE program is not required.

Consistent with domestic convention and general conformity thresholds, emission reductions must be calculated in short tons (2,000 pounds) and not pounds or metric or long tons. In addition, the calculations must include estimates for all criteria pollutants and their precursors, with the general exception of lead (Pb), ammonia (NH_3), and nitrogen dioxide (NO_2).

The emissions reduction assessment process involves a step-by-step progression that accounts for the baseline conditions and the proposed VALE project(s) intended to reduce emissions, with each step requiring documentation and verification.

Step 1: Collect and document data. The analysis begins with the collection of data for proposed low-emission vehicles and equipment. This information is used to compare baseline and VALE low-emission operating conditions, which are defined as follows:

[42] http://www.faa.gov/airports/environmental/vale

- The baseline condition reflects the operation of existing or new conventional-fuel vehicles and equipment that would occur if no VALE project were implemented.[43]

- The project condition reflects operating changes that result from implementation of the VALE low-emission project.

Step 2: Calculate project emission reductions. The FAA requires sponsors to use EDMS to calculate emissions reductions for VALE projects.

Step 3: Document emissions analysis. Results of emission reduction calculations are an integral part of the sponsor's proposal to the FAA for funding and to the State air quality agency for AERCs.

The emissions calculations are intended to support the sponsor's request for AERCs from the State air quality agency. Before planning a VALE project, sponsors should read the EPA AERC Report, *Guidance on Airport Emission Reduction Credits for Early Measures through Voluntary Airport Low-Emission Programs.* The AERC Report provides general guidance to State air quality agencies on AERC methodology and how AERCs should be granted to sponsors under the VALE program.

9.1.1 Current Year Basis and Examples

The sponsor calculates estimated project emission reductions (and AERCs) on the basis of the latest EPA and VALE program low-emission standards in effect during the *current year* (i.e., fiscal year of AIP and/or PFC funding).[44] These emission factors in AERC calculations are valid for the entire life of the project provided that AIP and/or PFC funding is approved in the same fiscal year. Moreover, the sponsor is not required to adjust these emission reduction factors during the project life as EPA new vehicle standards become cleaner over time.[45]

Three examples of the "current year" basis are provided below for clarification:

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[43] EPA 452/R-01-001, Section 16.3.4.a(1).

[44] The FAA and EPA agreed to use existing standards in the "*current year*" (i.e., the fiscal year of funding) as the basis for all annual emissions reduction and AERC calculations over the life of the project (see AERC Report, Chapter 4, Section 4.1). This approach is intended to give sponsors added incentive for early action and to simplify emission reduction methodology.

[45] Emission reduction calculations for the useful life of the project (current and future years) are based on the existing EPA and VALE emission standards for the *current year*. With each new year, the *current year* reflects the progression of cleaner EPA and VALE vehicle emission standards. However, while the sponsor's initial calculations during project application may need to be updated to reflect actual operations (e.g., approved funding, deployment, monitored use), the sponsor's emission calculations and AERCs are not subject to the established annual changes in future EPA or VALE emission standards for new vehicles. In effect, the VALE projects are "grandfathered" for the life of the project based on the standards in place when the project starts. Nevertheless, VALE projects may be subject to new regulations that EPA may establish in the future that affect existing emission sources and surplus status.

Example 1: A sponsor proposes a project in FY ‘11 that is funded in FY ‘11. In this case, the sponsor’s annual emission calculations over the estimated life of the project are based on EPA and VALE standards for FY ’11 (*current year*). This is intended to simplify the calculations and to provide an incentive for early action as emission standards improve over time.

Example 2: A sponsor prepares a proposal in FY ‘11 for funding in FY ’12, or for some reason does not receive project funding until FY ‘12. In this case, the sponsor must develop or revise the emission calculations based on EPA and VALE standards that are in place for FY ‘12. Since the FAA will review VALE standards annually, the sponsor is encouraged to contact the FAA to discuss possible modifications to the standards for the coming year.

Example 3: A sponsor submits a proposal, obtains funding, and implements a VALE project in FY ‘11. The sponsor waits 3 years before submitting an updated report to the State air quality agency for AERCs. During this time, EPA new vehicle standards and VALE low-emission program standards change. Regardless of this fact, the vehicle standards for FY ’11 that were used in the sponsor’s original application are valid and continue to be valid for the life of the project.

9.1.2 Timeframe

The timeframe for emissions reduction calculations generally corresponds to the useful life of project vehicles and equipment. Useful life estimates range from 10 years for various airport vehicles to 40 years for underground fuel hydrant systems (see Table 4-1 and Table 6-1). Emission reductions over the estimated useful life of VALE-funded vehicles and equipment are used to determine project cost effectiveness and AERCs.

Project life and the timeframe for emissions reduction calculations may be extended if a sponsor selects the “AERC Option” and agrees to replace VALE-funded vehicles and equipment with equivalent or cleaner low-emission technology (see page 1 of the sample Project Application Worksheet and Instructions in **Appendix D**).[46] By invoking the AERC Option, sponsors can obtain up to 20 years of AERCs for vehicles and equipment that have an estimated useful life of less than 20 years. However, it is important to note that the AERC Option has two major restrictions: 1) it does not pertain to equipment with a useful life of 20 years or more; and 2) it cannot be used to determine project cost effectiveness, which is based solely on the initial useful life of VALE-funded vehicles and equipment.

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[46] AERC Report (EPA *Guidance on Airport Emission Reduction Credits for Early Measures through Voluntary Airport Low Emission Programs)*, Section 6.2, “Life of the AERCs”.

9.1.3 Baseline Comparisons and Factors

Emission calculations and AERCs are based on the net emission reductions between the baseline and project conditions. Vehicle projects, for example, usually involve the net difference in emissions between baseline vehicles powered by diesel fuel or gasoline and project vehicles powered by cleaner alternative fuels. The net (surplus) reductions translate into an equal amount of AERCs for general conformity purposes. Emission reductions for the VALE program are rate-based and should be presented in tons of pollutants per calendar year (tpy) to one decimal place or to a maximum of three decimal places if the project is extremely small. Examples of how to calculate emission reductions based on either “old vs. new” or “new vs. new” baseline comparisons are provided below.

“Old vs. New” Comparisons

“Old vs. new” applies when existing vehicles or equipment are being replaced or retrofitted with new low-emission vehicles or engines prior to the end of their useful lives. The sponsor should rely on EDMS (which includes MOBILE on-road and NONROAD emission factors) to assess existing (old) conventional fuel vehicles that are being retired or replaced. The sponsor must identify each vehicle being retired or replaced. EDMS emission factors represent the basic historical averages for the national fleet, and use the study year to correlate the emission factors with the model year of the existing vehicle.

The important aspect of “old vs. new” comparisons is that the old equipment could have some remaining useful life at the time of replacement or retrofit. Therefore, the sponsor must calculate the emission reduction using the old equipment as the baseline condition.

> <u>Example of “old vs. new”:</u> A sponsor wishes to purchase a new electric baggage tug to replace an existing diesel baggage tug. At the time of replacement, the old diesel tug has 3 more years of useful life. The new electric baggage tug has an estimated useful life of 13 years. The emission comparison for the first 3 years is the difference between the old diesel tug and the new electric tug. Starting in year 4, the comparison becomes “new vs. new” because the old tug would be replaced at that time, presumably with another diesel unit. For “new vs. new,” the emission comparison is the difference between the new electric tug and a new diesel tug that meets the EPA vehicle standards in effect for the *current year* (i.e., the fiscal year of AIP and/or PFC funding). This comparison is extended for the remaining useful life of the new electric tug.

"New vs. New" Comparisons and Baseline Tables

"New vs. new" comparisons are used when a sponsor is adding new vehicles or equipment to airport operations. It applies: (1) when old vehicles or equipment are not being replaced; or (2) for the years of new vehicle or equipment life beyond the remaining useful life of the replaced units.

While EDMS offers emission factors for existing conventional fuel vehicles (NONROAD and MOBILE6 interfaces), the model does not provide sufficient new vehicle data. Therefore, sponsors have the following options for new vehicle emission factors (in order of preference):

1) EPA-certified data (or verified data for retrofit technology)
2) Manufacturer's emissions data with appropriate documentation
3) New vehicle VALE standards
4) Default EDMS emission factors with documented substitutions

An important aspect of "new vs. new" comparisons is that the sponsor has greater incentive to purchase low-emission vehicles now rather than later. This incentive for early action is based on the fact that the longer the sponsor waits to purchase a new vehicle, the cleaner EPA vehicle emission standards and the new baseline for the *current year* become.

> <u>Example of "new vs. new":</u> A sponsor seeks to purchase a new 40-foot shuttle bus powered by a CNG engine. Baseline emissions are for a new diesel bus engine, with emission factors based on EPA emission standards in place for the *current year* (the fiscal year of AIP and/or PFC funding). The baseline emissions are compared to emissions from the new CNG bus, which must have an engine certified to meet VALE standards. The difference between each set of emissions would equal the project emission reductions (and AERCs).

New vehicle baseline emission factors are provided below in **Tables 9-1 through 9-5** for "new vs. new" comparisons. These factors are helpful and save time because EDMS does not contain EPA emission standards or calculated midpoints.

Baseline emission factors for new Category 3, 4, and 5 vehicles (Tables 9.3 to 9-5) are the applicable EPA minimum emission standards. Because EPA standards for new light and medium-duty vehicles (Tables 9-1 and 9-2) offer a range of certification levels in support of national fleet averaging, the FAA has calculated the "midpoint" of emission standards to represent the average or typical baseline condition.

Emission factors shown in the tables for the current fiscal year (shaded) should be entered into EDMS as the baseline level for new vehicles and used for analysis (in tpy) of vehicle projects to be funded. The EDMS input screens for entering the data are as follows:

- For GAV, where emissions are expressed in grams per mile (g/mile), emission factors are entered under "Emissions" and "Roadways…"
- For GAV Category 3, users should reference Table 30 in the EPA "*Update of Heavy-Duty Engine Emission Conversion Factors for MOBILE6"* (EPA420-R-02-005, 2002) to find (bhp-hr/mi) conversion factors for diesel and gasoline transit buses.
- For GSE, where emissions are expressed in grams per brake horsepower hour (g/bhp-hr), the emission factors are entered under "User Created" GSE.

Future year (non-shaded) information is provided below only for reference if sponsors choose to plan ahead and explore airport emission reduction options for the future.

Table 9-1. "New vs. New" Baseline Emission Factors for Vehicle Category 1

Fiscal Year of AIP/PFC Funding Request	NOx (g/mile)	VOC (g/mile)	CO (g/mile)	PM2.5 (g/mile)
2011	0.11	0.083	3.15	0.015
2012	0.11	0.083	3.15	0.015
2013	0.11	0.083	3.15	0.015
2014	0.11	0.083	3.15	0.015

Note: Baseline emission factors for Vehicle Category 1 are the midpoint between the current VALE low-emission standard (Tier2-Bin2) and the dirtiest available standard in this category (Tier2-Bin8/in-use). Emission factors for this category could be higher (i.e., greater project emission reductions) if proposed vehicles are certified EPA Tier2-Bin1 level or California PZEV.

VOC emission factors were generated by multiplying NMOG emission factors by 0.999 based on guidance provided by EPA A420-P-04-001 "Conversion Factors for Hydrocarbon Emission Components."

Table 9-2. "New vs. New" Baseline Emission Factors for Vehicle Category 2

Fiscal Year of AIP/PFC Funding Request	NOx (g/mile)	VOC (g/mile)	CO (g/mile)	PM2.5 (g/mile)
2011	0.135	0.123	4.2	0.015
2012	0.135	0.123	4.2	0.015
2013	0.135	0.123	4.2	0.015
2014	0.135	0.123	4.2	0.015

Note: Baseline emission factors for Vehicle Category 2 are the midpoint between the current VALE low-emission standard (Tier2-Bin5) and the dirtiest available standard in this category (Tier2-Bin8/in-use). Emission factors for this category could higher (i.e., greater project emission reductions) if proposed vehicles are certified cleaner than Tier2-Bin5.

VOC emission factors were generated by multiplying NMOG emission factors by 0.999 based on guidance provided by EPA A420-P-04-001 "Conversion Factors for Hydrocarbon Emission Components."

Table 9-3. "New vs. New" Baseline Emission Factors for Vehicle Category 3

Fiscal Year of AIP/PFC Funding Request	Diesel (CI) & Gasoline (SI) Engines	NOx (g/bhp-hr)	VOC (g/bhp-hr)	CO (g/bhp-hr)	PM2.5 (g/bhp-hr)
2011	CI	0.2	0.15	11.25	0.01
	SI		0.146	10.7	
2012	CI	0.2	0.15	11.25	0.01
	SI		0.146	10.7	
2013	CI	0.2	0.15	11.25	0.01
	SI		0.146	10.7	
2014	CI	0.2	0.15	11.25	0.01
	SI		0.146	10.7	

Notes: Baseline emission factors for Vehicle Category 3 are based on the EPA national emission standards for on-road, heavy-duty compression ignition (CI) and spark ignition (SI) engines.

The current on-road HD standards for CO are 15.5 g/bhp-hr for diesel engines and 14.4 g/bhp-hr for gasoline engines. Therefore, the baseline emission factor for CO is the midpoint of 11.25 for diesel engines (15.5 + 7.0 program standard/2) and 10.7 for gasoline engines (14.4 + 7.0/2).

VOC emission factors were generated by multiplying NMHC emission factors by 1.04 for two- and four-stroke SI engines and by 1.07 for CI engines based on guidance provided by EPA A420-P-04-001 "Conversion Factors for Hydrocarbon Emission Components."

Table 9-4. "New vs. New" Baseline Emission Factors for Vehicle Category 4

Fiscal Year of AIP/PFC Funding Request	NOx (g/bhp-hr)	VOC (g/bhp-hr)	CO (g/bhp-hr)	PM2.5 (g/bhp-hr)
2011	1.61	0.373	3.28	0.01
2012	1.61	0.373	3.28	0.01
2013	1.61	0.373	3.28	0.01
2014	1.61	0.373	3.28	0.01

Notes: Baseline emission factors for Vehicle Category 4 are based on the EPA Tier 2 emission standards for large (>25 hp) non-road SI engines (40 CFR Parts 89, 1048, et al.).

Based on discussions with EPA, the combined standard of 2.01 g/bhp-hr for HC+NOx can be assumed to be a 20/80 split, respectively.

VOC emission factors were generated by multiplying HC emission factors by 0.933 for four-stroke SI engines based on guidance provided by EPA A420-P-04-001 "Conversion Factors for Hydrocarbon Emission Components."

Table 9-5. "New vs. New" Baseline Emission Factors for Vehicle Category 5

Fiscal Year of AIP/PFC Funding Request	Maximum Engine (hp)	NOx (g/bhp-hr)	VOC (g/bhp-hr)	CO (g/bhp-hr)	PM2.5 (g/bhp-hr)
2011	< 11	5.0	0.63	6.0	0.3
	11 to 25	5.0	0.63	4.9	0.3
	26 to 49	5.0	0.63	4.1	0.22
	50 to 99	3.3	0.21	3.7	0.22
	100 to 174	0.3	0.11	3.7	0.22
	175 to 749	0.3	0.11	2.6	0.01
	≥ 750	2.6	0.32	2.6	0.075
2012	< 11	5.0	0.63	6.0	0.3
	11 to 25	5.0	0.63	4.9	0.3
	26 to 49	5.0	0.63	4.1	0.22
	50 to 74	3.3	0.21	3.7	0.22
	75 to 99	3.3	0.21	3.7	0.01
	100 to 174	0.3	0.11	3.7	0.01
	175 to 749	0.3	0.11	2.6	0.01
	≥ 750	2.6	0.32	2.6	0.075
2013	< 11	5.0	0.63	6.0	0.3
	11 to 25	5.0	0.63	4.9	0.3
	26 to 49	2.8	0.63	4.1	0.02
	50 to 74	2.8	0.21	3.7	0.02
	75 to 99	3.3	0.15	3.7	0.01
	100 to 174	0.3	0.15	3.7	0.01
	175 to 749	0.3	0.15	2.6	0.01
	≥ 750	2.6	0.32	2.6	0.075
2014	< 11	5.0	0.63	6.0	0.3
	11 to 25	5.0	0.63	4.9	0.3
	26 to 49	2.8	0.63	4.1	0.02
	50 to 74	2.8	0.21	3.7	0.02
	75 to 99	3.3	0.15	3.7	0.01
	100 to 174	0.3	0.15	3.7	0.01
	175 to 749	0.3	0.15	2.6	0.01
	≥ 750	2.6	0.32	2.6	0.075

Notes: Baseline emission factors for Vehicle Category 5 are based on the EPA Tier Rule emission standards for non-road compression engines (40 CFR Parts 9, 69, 89, et al.).

For diesel engines, the HC to NMHC conversion factor is 0.984 (EPA, *Conversion Factors for Hydrocarbon Emission Components*, 420-P-04-001, April 2004).

VOC emission factors were generated by multiplying HC emission factors by 1.053 for CI engines based on guidance provided by EPA A420-P-04-001 "Conversion Factors for Hydrocarbon Emission Components."

9.2 EDMS Data Collection, Modeling and Reporting

9.2.1 EDMS

EDMS contains many capabilities that contribute to more efficient vehicle and equipment emission calculations for the VALE program. These capabilities include:

- A stand-alone post-processor for VALE applications called the *Emissions Reduction Report*, which standardizes and displays model results (see Figure 9-1).
- A direct interface to EPA MOBILE6 for on-road vehicle emissions. Designating the study year in EDMS will automatically retrieve the proper emission factors from MOBILE.
- The option of entering data through the EDMS graphical user interface or by using an external spreadsheet and importing those files into the model.

The EDMS *User's Manual* and other technical documents are available from the FAA Office of Environment and Energy (AEE) on the Internet at: www.faa.gov/about/office_org/headquarters_offices/aep/models/edms_model/.

Following VALE project approval and implementation, sponsors are encouraged to use the newest version of EDMS to update estimated project emission reductions for AERC Statements and use. Sponsors should weigh the value of additional or more refined modeling against the costs of reanalysis using a new version of the model.

9.2.2 Data and Analysis

The scope of data collection is limited to the airport operations and emission sources that are part of the VALE project. With regard to operations data, sponsors are encouraged to use actual historical data for vehicles and equipment if possible rather than EDMS default data.

Important usage factors include the number and type of units, rates of operation, useful life, and EPA-certified/verified emission levels as applicable. In the event that the sponsor lacks adequate historical records to determine hours of operation, a conservative estimate of existing operations should be developed using typical operating data for similar vehicles and equipment at the airport. A brief description of data requirements is provided below.

Vehicles

Data Development: The following information is needed to evaluate emissions from existing and proposed project vehicles:

- Number of units, by type
- Manufacturer
- Engine size
- Model and model year
- Fuel type
- Certification documentation

Additional GSE information includes:

- Annual average fuel consumption
- Annual average operating hours, by type

Additional GAV information includes:

- Average speed
- Average annual miles traveled

Sponsors may be able to count emission reductions and receive AERCs if non-airport vehicles (e.g., on-road regional fleets or private cars) use VALE-funded airport refueling and recharging stations. Emission reductions from non-project vehicles should be based on the proportion of reductions directly related to the VALE program. Except for this allowance, sponsors may not claim emission reductions for on-road vehicles that are considered part of metropolitan transportation plans and transportation improvement programs reflected in the transportation conformity process.

The sponsor should work with the State air quality agency to determine the level of emission reductions claimed for non-VALE vehicles. Documentation should include:

- Historical fueling records if available
- Planned vehicle use of VALE facilities

Emission Factors: For Vehicle Categories 1 and 2, where emission factors are expressed in grams per mile, the user should enter vehicle information into EDMS through a series of "Roadway" segments. For Vehicle Categories 4 and 5, where emission factors are expressed in grams per brake horsepower hour, the user should enter vehicle information into EDMS through a series of "User-Created GSE." For Vehicle Category 3, the user should determine equivalent grams per mile ratio and enter a "Roadway" segment.

The baselines should be developed with "user-defined" emission factors that are based on methodology and data presented in Section 9.1 above. For a new vehicle baseline, emission factors should be obtained from Tables 9-1 through 9-5. For an existing or old vehicle baseline, the emission factors should be determined using EPA NONROAD or MOBILE. Users can generate MOBILE emission factors directly within EDMS (defaults using national averages) or by running MOBILE and importing its emission factors into EDMS (for more local specificity).

Emission factors for VALE project vehicles should be certified levels, which meet or exceed the VALE program low-emission standards (see Chapter 5).

For proposed retrofits, the EDMS methodology should follow the appropriate vehicle category. Retrofit emission savings are generally expressed as a percentage reduction by pollutant. Project emission factors are determined by applying the percentage reduction to the EDMS-generated baseline emission factor.

Criteria Pollutants: Volatile Organic Compounds (VOCs), an ozone precursor, are the most relevant category of organic gases and hydrocarbons for assessing VALE project cost-effectiveness. If VOC emission factors are not available, VOCs can be estimated from related levels for non-methane organic gases (NMOG), total hydrocarbons (HC), or non-methane hydrocarbons (NMHC). EDMS factors and supporting EPA/FAA guidance should be used for VOC conversions.

On-road vehicle emission factors for PM_{10} should be determined by the ratio of $PM_{10}/PM_{2.5}$ default emission factors in MOBILE for the vehicle type and applying this percentage to the $PM_{2.5}$ values listed in Tables 5-2 and Tables 9-1 through 9-5 above.

Sulfur dioxide (SO_2) emission factors for conventionally-fueled on-road vehicles should be generated from MOBILE as the emission factors are fuel-based.

Gate Electrification

Gate electrification projects are the most popular VALE project type. These projects are among the most cost effective airport low-emission strategies and they provide direct cost savings to the airlines.

Gate electrification projects consist of gate power (400 Hz converters) and/or preconditioned air units (PCA). Power is needed for aircraft (e.g., lighting, avionics, maintenance) when passengers or employees are present. PCA units are used to pump heated or cooled air into an aircraft to keep the aircraft at a comfortable temperature for passengers and employees.

When used at the gate simultaneously, gate power and PCA enable parked aircraft to completely forego the use of APUs, resulting in reduced fuel consumption and emissions. However, gate power and PCA are independent systems that may be used differently. Among the factors that influence airline policy and pilot discretion on gate services are temperature and humidity, aircraft size, ground crew workload, and turnaround time.

The three situations for gate electrification projects are as follows:

- <u>APU emissions eliminated (</u>except for the default of 7 minutes needed on average to connect and disconnect gate services). In this situation, gate power and PCA are both provided to parked aircraft.

- <u>APU emissions avoided 5-30 percent of the time</u>, depending on location. In this situation, gate power is available and used 100 percent of the time while PCA is unavailable. As a result, APUs are still needed most of the time for heating and cooling the aircraft.

- No APU emission reductions. In this situation, PCA is provided but gate power is not. Since the use of gate power is assumed 100 percent of the time, APU usage is not reduced.

In the second situation above, where a gate is equipped with power but no PCA, the reduction in APU use depends upon the ambient temperature and/or humidity. For purposes of VALE calculations, APU are not used when the ambient temperature is between 45^{o} F and 50^{o} F and no external heating or cooling of the cabin is needed.[47]

To determine the amount of time that the temperature is between 45^{O} F and 50^{O} F at a given airport, the sponsor should obtain and average local temperature data for the most recent 5-year period. The recommended source of information is the National Climatic Data Center (NCDC) at http://www.ncdc.noaa.gov.

The recommended steps in preparing operational baseline and project scenarios for gate electrification projects are as follows:

1. Analyze the most recent and representative year of arrival and departure data at the airport to locate the most "representative" day of the year for numbers of operations and fleet mix (aircraft type and APU type).
2. Match arrivals with departures to obtain the number of aircraft turns and average gate times (i.e., departure times minus arrival times) at each of the proposed gates.
3. Cap gate time for long aircraft turnarounds at 60 minutes for narrow body aircraft and 90 minutes for wide body aircraft unless the APU is required to run for more time than it takes to load and unload passengers.
4. Once the "representative daily schedule" has been determined, re-scale operations into a "representative year" (multiply times 365 days in a year).

[47] Ambient temperature range based on conversations with airport and industry officials.

5. Build a full schedule for the project life, which may often involve a proportional increase in operations using an approved growth rate.[48]

In addition, the following assumptions may be used for the baseline scenario:

- All power and heating/cooling needs met via the use of APUs
- Aircraft are equipped with default APU units as identified in EDMS

And for the low-emission project scenario:

- Most power and heating/cooling needs met via the use of PCA and gate power
- A default of 7 minutes of APU time for connecting and disconnecting the PCA and gate power
- Aircraft are equipped with default APU units as identified in EDMS

EDMS users should take special note that aircraft must be entered in gate electrification projects to estimate APU emissions.

It is also recommended that users separate data inputs for gate power and PCA on combined projects. The reason is that the estimated useful life of gate power is 20 years, while the useful life of a PCA unit is 13 years.

With both gate power and PCA in the first 13 years of the project, APU emissions are avoided 100 percent of the time. In the last 7 years of the project, with only gate power, APU emissions are avoided only when the ambient temperature is between 45^{O} F and 50^{O} F. A simple way to set up modeling inputs for the last 7 years is to multiply the projected number of operations for years 14-20 by the percent of the year that the temperature is between 45^{O} F and 50^{O} F.

Boiler/HVAC Systems

Below are required data for each new boiler acquired for an airport heating plant or HVAC improvement. Typically, boilers are used for heating individual terminal buildings, hangars, or air traffic control towers. A separate analysis outside of EDMS may be required to determine annual fuel throughput for proposed HVAC systems and/or terminal boilers.

- Type of boiler
- Heat capacity
- Fuel type
- Fuel throughput
- Percentage of project serving non-revenue producing public-use areas

[48] DOT/FAA Terminal Area Forecast for the itinerant air carriers, the airport's approved Master Plan, or a recent Environmental Impact Statement,

User-defined emissions factors, sulfur/ash content, and pollutant control factors may be applied, if available. Otherwise, the EDMS default emission parameter values may be used.

9.2.3 Emissions Reduction Report

The EDMS Emissions Reduction (ER) Report is a required element in all VALE proposals. An example of the new ER Report format is shown in **Figure 9-1**. This version of the report will be available in EDMS 5.1.3, which the FAA expects to release in November 2010.

The ER Report provides a concise annual listing of estimated net emissions reductions for the proposed project. The emission results from the report are used to determine project cost effectiveness and the number of AERCs generated by the project, including extra AERCs if the sponsor makes a replacement commitment (option) to extend the useful life of vehicles and equipment up to 20 years.

To produce the ER Report, the user begins by selecting the VALE option in the EDMS "Study Properties" window and entering the number of project years. Next, the user goes to the "VALE Settings" window (see Emissions tab) to select project source groups and to match equipment for the baseline and project scenarios. EDMS source groups include: Aircraft, APU, GSE Population, Parking Facility, Roadway, Training Fire, and Stationary Source. The ER Report only presents the source groups that are selected for the VALE project analysis.

Results shown in the ER Report include baseline emissions, project emissions, and the net savings from the project for each year of the project. Values are presented for all of the major criteria pollutants, including ozone precursors. Summaries of emission levels by pollutant are presented at the bottom of the report.

Figure 9-1. Format of EDMS ER Report

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Emissions Reduction Report

Airport: VALE Applicant Airport
Units: Short Tons (2,000 pounds)

Year	Scenario	Source Group	CO	VOC	NOx	SOx	PM-10	PM-2.5
2011	Baseline							
		APUs	4.908	0.413	24.181	2.394	1.481	1.481
		GSE Population	N/A	N/A	N/A	N/A	N/A	N/A
	Subtotal		**4.908**	**0.413**	**24.181**	**2.394**	**1.481**	**1.481**
	with Project							
		APUs	1.321	0.111	6.510	0.645	0.399	0.399
		GSE Population	1.187	0.268	3.492	0.009	0.227	0.220
	Subtotal		**2.509**	**0.379**	**10.003**	**0.653**	**0.625**	**0.618**
	Net Change							
		APUs	*-3.587*	*-0.302*	*-17.671*	*-1.750*	*-1.082*	*-1.082*
		GSE Population	*1.187*	*0.268*	*3.492*	*0.009*	*0.227*	*0.220*
	Subtotal		***-2.399***	***-0.034***	***-14.179***	***-1.741***	***-0.855***	***-0.862***
2012	Baseline							
		APUs	4.908	0.413	24.181	2.394	1.481	1.481
		GSE Population	N/A	N/A	N/A	N/A	N/A	N/A
	Subtotal		**4.908**	**0.413**	**24.181**	**2.394**	**1.481**	**1.481**
	with Project							
		APUs	1.321	0.111	6.510	0.645	0.399	0.399
		GSE Population	1.065	0.249	3.203	0.008	0.206	0.200
	Subtotal		**2.386**	**0.360**	**9.713**	**0.653**	**0.605**	**0.599**
	Net Change							
		APUs	*-3.587*	*-0.302*	*-17.671*	*-1.750*	*-1.082*	*-1.082*
		GSE Population	*1.065*	*0.249*	*3.203*	*0.008*	*0.206*	*0.200*
	Subtotal		***-2.522***	***-0.053***	***-14.468***	***-1.741***	***-0.876***	***-0.882***
	Baseline							
		APUs	4.908	0.413	24.181	2.394	1.481	1.481
		GSE Population	N/A	N/A	N/A	N/A	N/A	N/A
	Subtotal		**4.908**	**0.413**	**24.181**	**2.394**	**1.481**	**1.481**
	Net Change							
		APUs	*-3.587*	*-0.302*	*-17.671*	*-1.750*	*-1.082*	*-1.082*
		GSE Population	*0.122*	*0.117*	*0.302*	*0.002*	*0.014*	*0.013*
	Subtotal		***-3.465***	***-0.185***	***-17.369***	***-1.747***	***-1.068***	***-1.069***
2029	Baseline							
		APUs	4.908	0.413	24.181	2.394	1.481	1.481
		GSE Population	N/A	N/A	N/A	N/A	N/A	N/A
	Subtotal		**4.908**	**0.413**	**24.181**	**2.394**	**1.481**	**1.481**
	with Project							
		APUs	1.321	0.111	6.510	0.645	0.399	0.399
		GSE Population	0.116	0.116	0.284	0.002	0.013	0.012
	Subtotal		**1.437**	**0.227**	**6.794**	**0.647**	**0.411**	**0.411**
	Net Change							
		APUs	*-3.587*	*-0.302*	*-17.671*	*-1.750*	*-1.082*	*-1.082*
		GSE Population	*0.116*	*0.116*	*0.284*	*0.002*	*0.013*	*0.012*
	Subtotal		***-3.471***	***-0.185***	***-17.387***	***-1.747***	***-1.070***	***-1.070***
2030	Baseline							
		APUs	4.908	0.413	24.181	2.394	1.481	1.481
		GSE Population	N/A	N/A	N/A	N/A	N/A	N/A
	Subtotal		**4.908**	**0.413**	**24.181**	**2.394**	**1.481**	**1.481**
	with Project							
		APUs	1.321	0.111	6.510	0.645	0.399	0.399
		GSE Population	0.222	0.232	0.539	0.004	0.023	0.022
	Subtotal		**1.543**	**0.343**	**7.049**	**0.649**	**0.422**	**0.421**
	Net Change							
		APUs	*-3.587*	*-0.302*	*-17.671*	*-1.750*	*-1.082*	*-1.082*
		GSE Population	*0.222*	*0.232*	*0.539*	*0.004*	*0.023*	*0.022*
	Subtotal		***-3.365***	***-0.070***	***-17.132***	***-1.745***	***-1.059***	***-1.060***
VALE-Funded Useful Life (no option)	**Baseline**		**49.081**	**4.129**	**241.813**	**23.941**	**14.808**	**14.808**
	with Project		**17.731**	**2.756**	**78.261**	**6.481**	**4.821**	**4.796**
	Net Change		***-31.349***	***-1.373***	***-163.552***	***-17.461***	***-9.987***	***-10.012***
Cumulative Total (with option)	**Baseline**		**98.161**	**8.258**	**483.625**	**47.881**	**29.615**	**29.615**
	with Project		**35.462**	**5.512**	**156.522**	**12.961**	**9.642**	**9.592**
	Net Change		***-62.698***	***-2.746***	***-327.103***	***-34.921***	***-19.973***	***-20.023***

9.3 Project Cost Effectiveness

This section presents information and methodology that the sponsor must use to calculate the cost effectiveness of the project. Cost effectiveness is a parameter that allows the FAA to assess whether the sponsor's proposed use of Federal dollars to reduce airport emissions will be accomplished in a fiscally responsible manner.

The FAA evaluates cost effectiveness on the basis of the project's total costs versus estimated emission reductions. Cost effectiveness is defined simply as the total amount of dollars spent on the project, as determined by the Federal share and the required local match if AIP funded, divided by project emission reductions (tons) over the estimated useful life of vehicles and equipment. This calculation is performed for each criteria pollutant (see **Appendix D**, Page 6 of the Project Application Worksheets).

Funding emphasis is on deployment – R&D is not eligible.

The emphasis of the VALE program is on airport capital improvement projects using proven low-emission technologies that are commercially viable. Because the emphasis of AIP and PFC programs is construction and deployment, R&D activities are not eligible. For proposed airport demonstration projects of commercially ready technology, sponsors should refer to the AIP Handbook (FAA Order 5100.38C, Chapter 5, Section 504(b)).

9.3.1 Cost Considerations

The sponsor must indicate the requested amount of AIP and/or PFC funding on the project application. If the sponsor is requesting AIP funding, the source of local matching funds must also be identified.

The sponsor is required to show due diligence by competitively bidding and assessing low-emissions technology and cost information prior to submitting a project application to the FAA.

On vehicles, cost information should always distinguish between eligible incremental costs, which are included in the cost effectiveness calculations, and base costs, which are not eligible project costs and are not included in the cost effectiveness calculations.

On infrastructure, cost information should include project formulation, engineering and design, and construction. Costs that are not allowed or assessed include feasibility studies, O&M, fuel, and separate facilities to store low-emission vehicles or equipment.

While the basis for project cost effectiveness is the initial capital investment, the sponsor is encouraged to develop supplemental life-cycle cost information and to submit this information in the VALE application. For example, electric vehicles generally cost less to operate and maintain than conventional fuel vehicles, even when accounting for battery replacement costs before the end of the vehicle's useful life.

For many categories of eligible projects, particularly large infrastructure projects, the agency will give additional consideration to projects that improve project cost-effectiveness through cost-sharing arrangements with airport tenants, local utilities, State and local governments, equipment manufacturers, and other stakeholders (see Chapter 6).

9.3.2 Cost Effectiveness Ranges

The cost effectiveness ranges provided in **Table 9-7** apply to all VALE program vehicle and infrastructure projects above $200,000[49]. The cost effectiveness ranges are reviewed annually and updated as needed based on VALE project experience and discussions with airport operators and equipment manufacturers. Although the ranges are recommended levels, they represent an important factor in VALE project approvals along with other budget and program considerations.

The FAA evaluates project cost effectiveness on the basis of total project costs[50] versus emission reductions over the useful life of vehicles and equipment. The emphasis of this evaluation will be on Level One pollutants.

Table 9-6. Cost Effectiveness Ranges

Pollutant	Cost Effectiveness Ranges ($/ton)
Ozone (NOx + VOC)	$10,000 to $30,000
CO	$10,000 to $15,000
PM_{10}	$100,000 to $175,000
$PM_{2.5}$	To Be Determined

[49] Cost effectiveness for projects with a total cost below $200,000 are unduly affected by project formulation and related expenses.
[50] For AIP-funded projects, "total project costs" is the sum of the grant amount and the required local match.

The FAA gains more experience each year in evaluating low-emission projects and recognizes that cost effectiveness varies by project type, project engineering requirements, local factors, and airport size. For example, the cost effectiveness of VALE vehicle projects is affected by increasingly cleaner EPA minimum fleet standards. With respect to infrastructure, a small project involving a refueling station may yield lower cost effectiveness (i.e., showing higher dollar values than the ranges listed above) because of the greater investment in supporting infrastructure versus emission savings.[51] Another example is gate electrification projects, for which cost effectiveness will vary by the amount of work required to upgrade electric lines and subsystems at the terminal.

9.4 Use of AERCs

As described in the AERC Report, sponsors are allowed to use earned AERCs to meet their CAA requirements for general conformity and new source review (NSR).[52] For demonstrating general conformity, sponsors are allowed to apply AERCs as "design measures" against the annual *de minimis* levels established in the CAA. For NSR permit requirements, AERCs are applied as emission "offsets." Notwithstanding differences in how AERCs may be allocated and applied for general conformity and NSR, AERCs earned by a sponsor for a particular year can only be counted towards the regulatory requirements of that same year. Once AERCs are used from the available "pool" of yearly AERCs, these AERCs are no longer available that year for either regulation.

The following example for general conformity illustrates how AERCs might be applied to an airport development project that exceeds the *de minimis* thresholds. Suppose a sponsor successfully completes two separate projects under the VALE program and receives AERCs for NOx emissions. VALE Project 1 is the conversion of employee transport buses to new alternative fuel engines, with a total useful life of 12 years. VALE Project 2 is the conversion of aircraft tugs to CNG fuel, with an expected useful life of 13 years. At some future time, an improvement project proposed for the same airport is estimated to cause construction emissions above the *de minimis* levels for NOx. In this scenario, the 5-year construction period overlaps with year 3 through year 7 of the VALE projects. This construction causes annual emissions of NO_x that exceed the *de minimis* threshold by 1 ton to 5 tons each year. The annual assignment of AERCs for NOx and the use of the credits that will allow the airport project to conform are illustrated in **Table 9-6**.

[51] Information on the cost effectiveness of various emissions reduction programs eligible under the Federal Highways Congestion Mitigation and Air Quality Improvement Program (CMAQ) can be found at the website: www.dieselforum.org/retrofit-tool-kit-homepage/cost-effectiveness-comparisons.

[52] Participating airport sponsors must comply with VALE program requirements and AIP grant assurances (FAA Orders 5100.38C and 5190.6B, and Federal Register Notice Vol. 64, No. 30, February 16, 1999, on "Policy and Procedures Concerning the Use of Airport Revenue") if additional emission credits (e.g., CO_2) from VALE projects are possible to obtain.

Table 9-7. Example Application of NOx AERCs

Grant/Action	Calendar Year of VALE Project Operations (tons per year)								
	1	2	3	4	5	6	7	8	9
CAAA *de minimis* threshold for NO_x	50	50	50	50	50	50	50	50	50
Direct and indirect NO_x emissions from airport improvement project			53	54	48	51	50		
VALE Project 1 AERCs	1	2	2	2	2	2	2	2	2
VALE Project 2 AERCs	0	0	4	4	4	4	4	4	4
Total AERCs available	1	2	6	6	6	6	6	6	6
AERCs used for General Conformity			4	5	0	2	1		
Annual balance of available AERCs after General Conformity	1	2	2	1	6	4	5	6	6
Annual NO_x emissions from construction with AERC use			49	49	48	49	49		

In this example, VALE Project 1 is initiated in the middle of year 1 and initially generates 1 tpy of (NOx) AERCs. The project's full emission reduction potential of 2 tpy of AERCs is generated for the following years. VALE Project 2 generates 4 tpy of AERCs each year beginning in year 3. The construction-related emissions of NOx resulting from the proposed improvement project are expected to exceed the *de minimis* threshold of 50 tpy in four of the construction years, beginning in year 3. In year 3, 4 tpy of AERCs would be used to bring the construction emissions down to 49 tons, which is below the *de minimis* threshold. Similarly, in year 4, 5 tpy of AERCs would be consumed; in year 5, no AERCs are needed; in year 6, 2 tpy of AERCs would be consumed; and in year 7, only 1 tpy of AERCs would be required. Each year, the balance of AERCs is equal to the total assigned from Project 1 and Project 2, minus the number of AERCs consumed to bring the construction emissions below the *de minimis* thresholds. After construction, since AERCs are permanent for the lifetime of the VALE project, the full value of Project 1 and Project 2 AERCs returns each year to their full emission reduction potential.

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APPENDIX A
GLOSSARY OF TERMS

Aftertreatment Device	Engine pollutant emissions are generally reduced by engine modifications, fuel specifications or exhaust gas aftertreatment. An aftertreatment device is a component used to reduce engine pollutant emissions downstream of the combustion chamber. Catalytic converters and particulate traps are examples of aftertreatment devices.
Airport-Dedicated	Located of primarily used at the airport.
Airport Owned	Owned directly by the sponsor.
Alternative Fuel	Consistent with the Energy Policy Act (EPAct), non-conventional fuels including: compressed natural gas (CNG), liquefied petroleum gas (LPG), hydrogen, electricity, and any liquid at least 85 percent of the volume of which consists of methanol (M85) or ethanol (E85).
Alternative Fuel Vehicle (AFV)	A vehicle that is powered by an alternative fuel.
Attainment Area	A geographic area in which levels of a criteria air pollutant meet the health-based primary standard (national ambient air quality standard, or NAAQS) for the pollutant. An area may have an acceptable level for one criteria air pollutant, but may have unacceptable levels for others. Thus, an area could be both attainment and nonattainment at the same time. Attainment areas are defined using federal pollutant limits set by EPA.
Base Cost	The cost of a conventional-fueled vehicle.
Bi-Fuel Vehicle	A vehicle that can operate on either an alternative fuel or conventional fuel, but not both simultaneously. Typically, the operator can manually choose which fuel to operate the vehicle.
Bio Fuel	Fuel that is produced from biomass, including corn, soybeans, and other grains. Bio-fuel is often part of a blend (e.g., "B5" represents 5 percent bio-fuel).
Brake Horsepower (bhp)	This value is determined experimentally with the use of a band brake, as the name implies, or more modernly, with an absorption dynamometer. Horsepower is the rate of doing work, measured in units equal to lifting 33,000 pounds a distance of one foot in one minute (1 hp = 0.746 kwh). As applied to an internal combustion engine, it is the amount of work done per minute by the torque developed by the engine. BHP = T x RPM / 5252 where, T = torque expressed in foot-pounds

	RPM = engine revolutions/minute
Carbon Monoxide (CO)	A criteria pollutant that is colorless, odorless, poisonous gas, and is produced by incomplete burning of carbon-based fuels, including gasoline, oil, and wood. Carbon monoxide is also produced from incomplete combustion of many natural and synthetic products (e.g., cigarette smoke). When carbon monoxide gets into the body, it combines with chemicals in the blood and prevents the blood from bringing oxygen to cells, tissues and organs. The body's parts need oxygen for energy, so high-level exposures to carbon monoxide can cause serious health effects, with death possible from massive exposures. Symptoms of exposure to carbon monoxide can include vision problems, reduced alertness, and general reduction in mental and physical functions. Carbon monoxide exposures are especially harmful to people with heart, lung and circulatory system diseases.
Catalytic Converter	A catalytic converter consists of a metal housing filled with a hard material that is covered with a catalytic compound. The presence of the catalytic converter in the engine exhaust system breaks down the chemicals in the exhaust and reduces harmful pollutant emissions.
Certified	Certification means, with respect to new highway and non-road engines, obtaining a certificate of conformity from the EPA for an engine family that complies with the highway or non-road engine emission standards and requirements.
Clean Air Act (CAA)	The original Clean Air Act was passed in 1963, but the national air pollution control program is actually based on the 1970 version of the law. The 1990 Clean Air Act Amendments are the most far-reaching revisions of the 1970 law. The 1990 amendments are routinely referred to as the 1990 Clean Air Act.
Clean Diesel (ULSD)	Ultra low-sulfur diesel fuel that has 15 ppm or less of sulfur
Clean Fuels	Low-pollution fuels that can replace ordinary gasoline. These are *alternative* fuels, such as electricity, gasohol (gasoline-alcohol mixtures), natural gas and LPG (liquefied petroleum gas).
Conventional Fuel	Petroleum-based fuels, primarily gasoline and diesel
Commercial Service Airport	A publicly owned airport in a State that the Secretary determines has at least 2,500 passenger boardings each year and is receiving scheduled passenger aircraft service. The airport must also be listed in the FAA's NPIAS.
Cost Effectiveness	The greatest air quality benefits measured by the amount of emissions reduced per dollar of funds expended.
Criteria Air Pollutants	A group of very common air pollutants regulated by EPA on the basis of health and/or environmental effects of pollution.

	Criteria air pollutants are widely distributed all over the country. They are CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, O_3, and lead.
Diesel Engine	An engine that operates on diesel fuel and principally relies on compression-ignition for engine operation. The non-use of a throttle during normal operation is indicative of a diesel engine.
Electric Vehicle (EV)	Vehicles that derive 100 percent of their motive energy from the electric grid via batteries.
Engine Family	Each group of engines with similar emission characteristics is defined as a separate engine family. Vehicles or engines in an engine family are expected to have similar emission characteristics. A permanent label is affixed to the engine, which lists the engine family designation as well as other important information.
Flexible-Fuel Vehicles (FFV)	Vehicles that automatically detect the blended fuel composition in the fuel tank, and adjust the combustion parameters accordingly for optimum engine performance. Typically, FFVs operate on an alcohol-gasoline blend such as ethanol/gasoline or methanol/gasoline.
Fuel Cells	Energy released by the oxidation of hydrogen to water is directly converted to an electrical current.
Fuel Cell Vehicle	An electric vehicle powered by a chemical hydrogen fuel cell battery. These vehicles may or may not be capable of capturing regenerative braking energy.
Gross Vehicle Weight Rate (GVWR)	The manufacturer's specified maximum design loaded weight for a single vehicle (40 CFR 86.1803-01).
Ground Access Vehicles (GAV)	Vehicles licensed for on-road use.
Ground Support Equipment (GSE)	Non-road vehicles used on the airport tarmac to service aircraft and other airport-specific duties.
Highway Engine	Any engine which is designed to transport people or property on a street or highway.
Hybrid Vehicle	As defined in Subpart R – General Provisions for the Voluntary National Low-emission Vehicle Program for Light-Duty Vehicles and Light-Duty Trucks (62 FR 31242, June 6, 1997), any vehicle defined as a *series hybrid electric vehicle* that delivers power to the wheels by battery-powered electric motor, but which also incorporates the use of a combustion engine to provide power to the battery and/or electric motor; *a parallel hybrid electric vehicle* that delivers power to the wheels by either a combustion engine and/or by a battery-powered electric motor, or a *battery assisted combustion engine vehicle* that uses stored battery packs to propel the vehicle.
Hydrocarbons (HC)	An exhaust and evaporative pollutant of hydrogen and carbon atoms resulting from unburned fuel. The volatile portion of

	HCs contribute to the formation of ozone which is responsible for the choking, coughing, and stinging eyes associated with ozone smog. Ozone damages lung tissue, aggravates respiratory disease, and makes people more susceptible to respiratory infections.
Incremental Cost	The cost difference between a low-emissions vehicle typically powered by an alternative fuel, and the conventional-fueled equivalent
Large Hub Airport	A commercial service airport that has 1 percent or more of the annual passenger boardings.
Level One Pollutants	The criteria pollutant(s) that is causing the area nonattainment or maintenance status.
Level Two Pollutants	The remaining criteria pollutants that are not Level One Pollutants.
Low-Emission Technology	Technology for vehicles and equipment whose emission performance is the best achievable under emission standards established by the EPA and that relies exclusively on alternative fuels that are substantially non-petroleum based, as defined by the Department of Energy, but not excluding hybrid systems or natural gas powered vehicles.
Low-Emission Vehicle (LEV)	Any vehicle certified to the low-emission vehicle standards specified in this program.
Low Sulfur Diesel Fuel	Current EPA regulations specify that diesel test fuel contain 300-500 ppm sulfur for highway engines and 300-4,000 ppm sulfur for non-road engines. Significant reductions from these current sulfur levels are necessary in order for many retrofit technologies to provide meaningful, lasting emissions reductions. The manufacturers of these retrofit technologies will specify the maximum allowable sulfur level for effective operation of its products. In addition to enabling a wide array of emissions control technologies, the use of low sulfur alone reduces emissions of particulate matter. Sulfate, a major constituent of particulate matter, is produced as a byproduct of burning diesel fuel containing sulfur. Reducing the sulfur content of fuel in turn reduces sulfate byproducts of combustion and therefore particulate matter emissions.
Maintenance Area (MA)	A geographic area that was formerly nonattainment for one or more criteria pollutants, but has experienced three or more years of no violations of the NAAQS. Maintenance status typically lasts for two consecutive decades to ensure air quality has improved adequately.
Medium-Duty Passenger Vehicle (MDPV)	Federal definition for vehicles between 8,501-10,000 GVWR designed primarily for the transport of persons, including conversion vans. Not included are: any vehicle that has a capacity of more than 12 persons total, any vehicle designed to accommodate more than 9 persons in seating rearward of

	the driver's seat, and any vehicles that has a cargo box of six feet or more in interior length.
Medium Hub Airport	A commercial service airport that has at least 0.25 percent but less than 1 percent of the annual passenger boardings.
Model Year (MY)	The manufacturer's annual new model production period which includes January 1 of the calendar year, ends no later than December 31 of the calendar year, and does not begin earlier than January 2 of the previous calendar year. Where a manufacturer has no annual new model production period, model year means calendar year.
National Ambient Air Quality Standards (NAAQS)	The Clean Air Act (amended in 1990), requires EPA to set National Ambient Air Quality Standards for pollutants considered harmful to public health and the environment. The Clean Air Act established two types of national air quality standards. Primary standards set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings. The EPA has set NAAQS for six principal pollutants, which are called "criteria" pollutants. They are O_3, CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and lead.
Natural Gas	Either compressed natural gas (CNG) or liquefied natural gas (LNG).
Neofit	A pre-market modification of a vehicle with control equipment directly from an OEM and before delivering the vehicle to the purchaser.
New Vehicle	Vehicle purchased from an OEM that essentially has no miles on it. This definition does not include reprogrammed or re-engined vehicles.
Nitrogen Oxides (NOx)	Nitrogen oxides are a family of reactive gaseous compounds that contribute to air pollution in both urban and rural environments. NOx emissions are produced during the combustion of fuels at high temperatures. The primary sources of atmospheric NOx include highway sources (such as light-duty and heavy-duty vehicles), non-road sources (such as construction and agricultural equipment, and locomotives) and stationary sources (such as power plants and industrial boilers). NOx can irritate the lungs, cause bronchitis and pneumonia, and lower resistance to respiratory infections. Nitrogen oxides are an important precursor both to ozone and acid rain, and may affect both terrestrial and aquatic ecosystems.
Nonattainment Area	A locality where air pollution levels persistently exceed

(NA)	National Ambient Air Quality Standards. Designating an area as nonattainment is a formal rulemaking process and EPA normally takes this action only after air quality standards have been exceeded for several consecutive years.
Non Methane Hydrocarbons (NMHC)	Same as the definition of non-methane organic gases (NMOG), but excludes oxygenated hydrocarbons such as alcohols and aldehydes.
Non Methane Organic Gases (NMOG)	Organic compounds in the atmosphere that contain the element carbon (C) and are reactive with nitrogen oxides in the presence of sunlight to produce ozone in the troposphere. This includes oxygenated hydrocarbons such as alcohols and aldehydes, but does not include less reactive hydrocarbons such as methane.
Non-road Engine	Although non-road engines can be self-propelled vehicles that are not licensed to travel on streets and highways, their primary function is to perform a particular task. Examples of non-road engines include ground support equipment, garden tractors, lawnmowers, bulldozers, and cranes.
Oxidation Catalyst	A type of catalyst (e.g., catalytic converter) which chemically converts HC (hydrocarbons) and CO (carbon monoxide) to water vapor and carbon dioxide.
Oxygenated fuel	Special type of gasoline, which burns more completely than regular gasoline in cold start conditions; more complete burning results in reduced production of CO. In some parts of the country, CO release from cars starting up in cold weather makes a major contribution to pollution. In these areas, gasoline refiners must market oxygenated fuels, which contain higher oxygen content than regular unleaded gasoline.
Ozone (O_3)	Ozone is a photochemical oxidant and the major component of smog. While O_3 in the upper atmosphere shields the earth from harmful ultraviolet radiation that comes from the sun, high concentrations of O_3 at ground level are a major health and environmental concern. O_3 is not emitted directly into the air but is formed through complex chemical reactions between emissions of volatile organic compounds (VOC) and nitrogen oxides (NOx) in the presence of sunlight. These reactions are stimulated by sunlight and temperature so that peak O_3 levels occur typically during the warmer times of the year. Both VOCs and NOx are emitted by transportation and industrial sources such as vehicles, chemical manufacturing, dry cleaners and paint shops. O_3 causes health problems because it damages lung tissue, reduces lung function and sensitizes the lungs to other irritants. Scientific evidence indicates that ambient levels of O_3 not only affect people with impaired respiratory systems,

	such as asthmatics, but healthy adults and children as well. Exposure to O_3 for several hours at relatively low concentrations has been found to significantly reduce lung function and induce respiratory inflammation in normal, healthy people during exercise. This decrease in lung function generally is accompanied by symptoms including chest pain, coughing, sneezing, and pulmonary congestion.
Particulate Matter (PM)	PM includes dust, dirt, soot, smoke and liquid droplets directly emitted into the air by sources such as factories, power plants, cars, engines, construction activity, fires and natural windblown dust. Particles formed in the atmosphere by condensation or by transformation of emitted gases are also considered particulate matter. Exposure to PM include effects on breathing and respiratory symptoms, aggravation of existing respiratory and cardiovascular disease, alterations in the body's defense systems against foreign materials, damage to lung tissue, as well as premature death. The major subgroups of the population that appear to be most sensitive to the effects of PM include individuals with chronic obstructive pulmonary or cardiovascular disease or influenza, asthmatics, the elderly and children. Particulate matter is a cause of impaired visibility in the United States. The EPA has established NAAQS for PM with aerodynamic diameters less than or equal to 10 micrometers (PM_{10}) and PM with aerodynamic diameters less than or equal to 2.5 micrometers ($PM_{2.5}$).
Particulate Trap/Filter	An aftertreatment device which filters or traps diesel particulate matter from engine exhaust until the trap becomes loaded to the point that a regeneration cycle is implemented to burn off the trapped particulate matter.
Program Low-Emission Standards	Low-emission EPA standards that are more stringent than existing vehicle emission standards, with the goal of generating early voluntary emission reductions.
Project Life	The number of years that a project lasts based on the longest useful life of vehicles or equipment or alternatively up to 20 years if the sponsor makes a replacement commitment (AERC Option).
Public Access	The use of VALE-funded low-emission technology by persons not affiliated with the airport or related operations.
Retrofit	Refers to aftermarket vehicle improvements that reduce emissions, including vehicle re-engining or repowering, the addition of pollution control aftertreatment equipment to certified engines, and engine conversions to cleaner fuels.

Small Hub Airport	A commercial service airport that has at least 0.05 percent but less than 0.25 percent of the annual passenger boardings.
Sponsor	Also known as "Airport sponsors" that are planning agencies, public agencies, or private airport owners/operators that have the legal and financial ability to carry out the requirements of the AIP program. The term is also used in this document to refer to the PFC program, which is restricted to "public agencies."
State Implementation Plan (SIP)	A State Implementation Plan (SIP) is a written plan that describes a state's strategy for achieving and maintaining the National Ambient Air Quality Standards. Section 110 of the Clean Air Act requires states with areas that do not meet the air standards to develop a written SIP outlining steps they will take to reduce air pollution. The purpose of a SIP is to ensure the implementation of programs that will reduce emissions.
Sulfur Dioxide (SO_2)	A criteria air pollutant. SO_2 is a gas produced by burning fuels containing sulfur. Some industrial processes, such as production of paper and smelting of metals, produce sulfur dioxide. SO_2 is closely related to sulfuric acid, a strong acid. SO_2 plays an important role in the production of acid rain.
Ultra Low-emission Vehicle (ULEV)	Defined in 40 CFR 88.302, either conventionally or alternatively fueled.
Ultra Low Sulfur Diesel (ULSD)	Current EPA regulations specify that ultra low sulfur diesel fuel contain 15 ppm sulfur.
Useful Life	The number of years that a vehicle or piece of equipment generally functions as originally manufactured, without catastrophic breakdown or major repair.
Verified Retrofit Technology List	This is a list that EPA prepares of Heavy Duty Diesel (HDD) emission control technologies that are suitable for use with HDD engines. If a control technology appears on EPA's list, the manufacturer's emission reduction claims have been confirmed through EPA's Environmental Technology Verification Program. For more information see http://www.epa.gov/etv/centers/center5.html.
Volatile Organic Compounds (VOC)	Generally, all organic compounds in the atmosphere that contain the element carbon (C) and that are reactive to drive the formation of ozone in the presence of sunlight. This includes oxygenated compounds such as alcohols and aldehydes. Some hydrocarbons are less ozone-forming than other hydrocarbons, so EPA has officially excluded them from the definition of regulated hydrocarbons or VOCs. These compounds include methane, ethane, and compounds not commonly found in large quantities in engine exhaust like chlorohydrocarbons. Many VOCs are also hazardous air pollutants.

APPENDIX B
VISION 100 – CENTURY OF AVIATION REAUTHORIZATION ACT

This Appendix provides the applicable Vision 100 Legislative Sections that support the FAA VALE program:

- Section 121 – Low-emission airport vehicles and ground support equipment
- Section 151 – Increase in apportionment for, and flexibility of, noise compatibility planning programs
- Section 158 – Emission credits for air quality projects
- Section 159 – Low-emission airport vehicles and infrastructure

They are as follows:

Subtitle B – Passenger Facility Fees

SEC. 121. LOW-EMISSION AIRPORT VEHICLES AND GROUND SUPPORT EQUIPMENT.

(a) IN GENERAL. – Section 40117(a)(3) is amended by inserting at the end the following:

"(G) A project for converting vehicles and ground support equipment used at a commercial service airport to low-emission technology (as defined in section 47102) or to use cleaner burning conventional fuels, retrofitting of any such vehicles or equipment that are powered by a diesel or gasoline engine with emission control technologies certified or verified by the Environmental Protection Agency to reduce emissions, or acquiring for use at a commercial service airport vehicles and ground support equipment that include low-emission technology or use cleaner burning fuels if the airport is located in an air quality nonattainment area (as defined in section 171(2) of the Clean Air Act (42 U.S.C. 7501(2))) or a maintenance area referred to in section 175A of such Act (42 U.S.C. 7505a) and if such project will result in an airport receiving appropriate emission credits as described in section 47139.".

(b) MAXIMUM COST FOR CERTAIN LOW-EMISSION TECHNOLOGY PROJECTS. – Section 40117(b) is amended by adding at the end the following:

"(5) MAXIMUM COST FOR CERTAIN LOW-EMISSION TECHNOLOGY PROJECTS. – The maximum cost that may be financed by imposition of a passenger facility fee under this section for a project described in subsection (a)(3)(G) with respect to a vehicle or ground support equipment may not exceed the incremental amount of the project cost that is greater than the cost of acquiring a vehicle or equipment that is not low-emission and would be used for the same purpose, or the cost of low-emission retrofitting, as determined by the Secretary.”.

(c) GROUND SUPPORT EQUIPMENT DEFINED. – Section 40117(a) is amended –
  (1) by redesignating paragraphs (4) and (5) as paragraphs (5) and (6), respectively; and
  (2) by inserting after paragraph (3) the following: “(4) GROUND SUPPORT EQUIPMENT. – The term ‘ground support equipment’ means service and maintenance equipment used at an airport to support aeronautical operations and related activities.”.

(d) GUIDANCE. – The Secretary, in consultation with the Administrator of the Environmental Protection Agency, shall issue guidance determining eligibility of projects, and how benefits to air quality must be demonstrated, under the amendments made by this section.

Subtitle C – AIP Modifications

SEC. 151. INCREASE IN APPORTIONMENT FOR, AND FLEXIBILITY OF, NOISE COMPATIBILITY PLANNING PROGRAMS.

Section 47117(e)(1)(A) is amended –
(1) by striking “At least 34 percent” and inserting “At least 35 percent”;
(2) by striking “of this title and” and inserting a comma;
(3) by striking “of this title.” And inserting “, for noise mitigation projects approved in an environmental record of decision for an airport development project under this title, for compatible land use planning and projects carried out by State and local governments under section 47141, and for airport development described in section 47102(3)(F), 47102(3)(K), or 47102(3)(L) to comply with the Clean Air Act (42 U.S.C. 7401 et seq.)”; and
(4) by striking “34 percent requirement” and inserting “35 percent requirement”.

SEC. 158. EMISSION CREDITS FOR AIR QUALITY PROJECTS.

(a) EMISSIONS CREDIT. – Subchapter I of chapter 471 is further amended by adding at the end the following:

“§ 47139. Emission credits for air quality projects

“(a) IN GENERAL. – The Administrator of the Environmental Protection Agency, in consultation with the Secretary of Transportation, shall issue guidance on how to ensure that airport sponsors receive appropriate emission reduction credits for carrying out projects described in sections 40117(a)(3)(G), 47102(3)(F), 47102(3)(L). Such guidance shall include, at a minimum, the following conditions:

"(1) The provision of credits is consistent with the Clean Air Act (42 U.S. C. 7402 et seq.).

"(2) Credits generated by the emission reductions are kept by the airport sponsor and may only be used for purposes of any current or future general conformity determination under the Clean Air Act or as offsets under the Environmental Protection Agency's new source review program for projects on the airport or associated with the airport.

"(3) Credits are calculated and provided to airports on a consistent basis nationwide.

"(4) Credits are provided to airport sponsors in a timely manner.

"(5) The establishment of a method to assure the Secretary that, for any specific airport project for which funding is being requested, the appropriate credits will be granted.

"(b) ASSURANCE OF RECEIPT OF CREDITS. – As a condition for making a grant for a project described in section 47102(3)(F), 47102(3)(K), 47102(3)(L), or 47140 or as a condition for granting approval to collect or use a passenger facility fee for a project described in section 40117(a)(3)(G), 47102(3)(K), 47102(3)(L), or 47140, the Secretary must receive assurance from the State in which the project is located, or from the administrator of the Environmental Protection Agency where there is a Federal implementation plan, that the airport sponsor will receive appropriate emission credits in accordance with the conditions of this section.

"(c) PREVIOUSLY APPROVED PROJECTS. – The Administrator of the Environmental Protection Agency, in consultation with the Secretary, shall determine how to provide appropriate emissions credits to airport projects previously approved under section 47136 consistent with the guidance and conditions specified in subsection (a).

"(d) STATE AUTHORITY UNDER CAA. – Nothing in this section shall be construed as overriding existing State law or regulation pursuant to section 116 of the Clean Air Act (42 U.S.C. 7416).".

(b) CONFORMING AMENDMENT. – The analysis for chapter 471 is further amended by inserting after the item relating to section 47138 the following: "47139. Emission credits for air quality projects.".

SEC. 159. LOW-EMISSION AIRPORT VEHICLES AND INFRASTRUCTURE.

(a) AIRPORT GROUND SUPPORT EQUIPMENT EMISSIONS RETROFIT PILOT PROGRAM. –

(1) IN GENERAL. – Subchapter I of chapter 471 is further amended by adding at the end the following:

"§ 47140. Airport ground support equipment emissions retrofit pilot program

"(a) IN GENERAL. – The Secretary of Transportation shall carry out a pilot program at not more than 10 commercial service airports under which the sponsors of such airports may use an amount made available under section 48103 to retrofit existing eligible airport ground support equipment that burns conventional fuels to achieve lower emissions utilizing emission control technologies certified or verified by the Environmental Protection Agency.

"(b) LOCATION IN AIR QUALITY NONATTAINMENT OR MAINTENANCE AREAS. – A commercial service airport shall be eligible for participation in the pilot program only if the airport is located in an air quality nonattainment area (as defined in section 171(2) of the Clean Air Act (42 U.S.C. 7501(2))) or a maintenance area referred to in section 175A of such Act (42 U.S.C. 7505a).

"(c) SELECTION CRITERIA. – In selecting from among applicants for participation in the pilot program, the Secretary shall give 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 pilot program.

"(d) MAXIMUM AMOUNT. – Not more than $500,000 may be expended under the pilot program at any single commercial service airport.

"(e) GUIDELINES. – The Secretary, in consultation with the Administrator of the Environmental Protection Agency, shall establish guidelines regarding the types of retrofit projects eligible under the pilot program by considering remaining equipment useful life, amount of emission reduction in relation to the cost of projects, and other factors necessary to carry out this section. The Secretary may give priority to ground support equipment owned by the airport and used for airport purposes.

"(f) ELIGIBLE EQUIPMENT DEFINED. – In this section, the term 'eligible equipment' means ground service or maintenance equipment that is located at the airport, is used to support aeronautical and related activities at the airport, and will remain in operation at the airport for the life or useful life of the equipment, whichever is earlier.".

(2) CONFORMING AMENDMENT. – The analysis for chapter 471 is further amended by inserting after the item relating to section 47139 the following:

"47140. Airport ground support equipment emissions retrofit pilot program.".

(b) ACTIVITIES ADDED TO DEFINITION OF AIRPORT DEVELOPMENT. –

(1) IN GENERAL. – Section 47102(3) is amended –

(A) by striking subparagraphs (J), (K), and (L) and redesignating subparagraph (M) as subparagraph (J); and

(B) by adding at the end the following:

"(K) work necessary to construct or modify airport facilities to provide low-emission fuel systems, gate electrification, and other related air quality improvements at a commercial service airport if the airport is located in an air quality nonattainment or maintenance area (as defined in sections 171(2) and 175A of the Clean Air Act (42 U.S.C. 7501(2); 7505a) and if such project will result in an airport receiving appropriate emission credits, as described in section 47139.

"(L) a project for the acquisition or conversion of vehicles and ground support equipment, owned by a commercial service airport, to low-emission technology, if the airport is located in a air quality nonattainment or maintenance area (as defined in sections 171(2) and 175A of the Clean Air Act (42 U.S.C. 7501(2) ; 7505a) and if such project will result in an airport receiving appropriate emission credits as described in section 47139.".

(2) GUIDANCE. –

(A) ELIGIBLE LOW-EMISSION MODIFICATIONS AND IMPROVEMENTS. – The Secretary of Transportation, in consultation with the Administrator of the Environmental Protection Agency, shall issue guidance describing eligible low-emission modifications and improvements, and stating how airport sponsors will demonstrate benefits, under section 47102(3)(K) of title 49, United States Code, as added by this subsection.

(B) ELIGIBLE LOW-EMISSION VEHICLE TECHNOLOGY. – The Secretary, in consultation with the Administrator, shall issue guidance describing eligible low-emission vehicle technology, and stating how airport sponsors will demonstrate benefits, under section 47102(3)(L) of title 49, United States Code, as added by this subsection.

(c) ALLOWABLE PROJECT COST. – Section 47110(b) is amended –

(1) by striking “and” at the end of paragraph (4);

(2) by striking the period at the end of paragraph (5) and inserting “; and”; and

(3) by adding at the end the following:

“(6) if the cost is for a project not described in section 47102(3) for acquiring for use at a commercial service airport vehicles and ground support equipment owned by an airport that include low-emission technology, but only to the extent of the incremental cost of equipping such vehicles or equipment with low-emission technology, as determined by the Secretary.”.

(d) LOW-EMISSION TECHNOLOGY EQUIPMENT. – Section 47102 (as amended by section 801 of this Act) is further amended by inserting after paragraph (10) the following:

“(11) ‘low-emission technology’ means technology for vehicles and equipment whose emission performance is the best achievable under emission standards established by the Environmental Protection Agency and that relies exclusively on alternative fuels that are substantially nonpetroleum based, as defined by the Department of Energy, but not excluding hybrid systems or natural gas powered vehicles.”.

APPENDIX C
SPECIAL CONDITIONS FOR AIP GRANTS AND PFC APPROVALS

The following language should be inserted as “special conditions” in all AIP grant agreements and as a part of the determination paragraph or acknowledgement letter in PFC approvals for this program.

1. “Vehicles and equipment purchased with assistance from this [grant/approval] shall be maintained and used for their useful life at the airport for which they were purchased. Moreover, any vehicles or equipment replaced under this program shall not be transferred to another airport or location within the same or any other nonattainment or maintenance area. No airport-owned vehicles or equipment may be transferred to, taken to, or used at another airport without the consent of the Federal Aviation Administration, in consultation with the U.S. Environmental Protection Agency and State air quality agency.”

   “In the event that funds from this approval are used to assist parties other than the [airport sponsor /public agency], the [airport sponsor/public agency] shall establish enforceable agreements with the purchasing or leasing party. These signed agreements, provided to the Federal Aviation Administration prior to project approval, shall require all vehicles and equipment to remain at the airport for their useful life in accordance with the program and leasing requirements specified in the VALE Technical Report.”

2. “All vehicles and equipment purchased with assistance from this action shall be clearly labeled using the VALE program emblem designed and specified by the Federal Aviation Administration.”

3. “The [airport sponsor/public agency] shall maintain annual reporting records of all vehicles and equipment purchased with assistance from this action. These public records shall contain detailed information involving individual vehicles and equipment, project expenditures, cost effectiveness, and emission reductions.”

4. “The [airport sponsor/public agency] certifies that it shall replace any disabled or seriously damaged vehicle or equipment purchased with assistance from this action, at any time during its useful life, with an equivalent vehicle or unit that produces an equal or lower level of emissions. The [airport sponsor/public agency] assumes all financial responsibility for replacement costs.

   The [airport sponsor/public agency] also certifies that it shall fulfill this replacement obligation, beyond the useful life of the affected vehicle or equipment, if the [airport sponsor/public agency] has opted for an extended period of AERCs in its project application or subsequently."

APPENDIX D
PROJECT APPLICATION WORKSHEETS

For use in project applications, the application workbook contains six worksheets (spreadsheets) that are intended to standardize project applications, to automate the process for more convenience and quality control, and to simplify the process for sponsors and reviewing agencies alike. The worksheets are required with the submittal of each VALE project application to the FAA and State air quality agency. The most current version of the worksheets must be used.

The FAA prefers the electronic use of the program application worksheets. Electronic versions of these worksheets can be downloaded at: http://www.faa.gov/airports/environmental/vale. Sponsors should copy worksheets for vehicles (Page 2) and infrastructure (Page 3) as many times as needed to represent the total number of project vehicles and all elements of the project infrastructure.

Below are page-by-page instructions for completing the worksheets as part of the overall project application. CAUTION: The workbook contains equations embedded into some cells of the worksheets. These equations automatically calculate parameters and determine the distribution of requested funds from available sources. The workbook requires careful use because it is not locked or secure.

Page 1 – General Information

The sponsor fills out this general information page with contact information, airport characteristics, the status of air quality at the airport, and the timeframe for emission reduction calculations and AERCs. The *Air Quality Proposal Date* should be entered into cell L7, and it will automatically repeat at the top of each subsequent page in the workbook.

Page 1 also includes the "AERC Option", which the sponsor may choose if they want to obtain AERCs for up to 20 years and are willing to replace VALE-funded vehicles and equipment over that period of time. If this option is selected, place an "X" in cell F29 of Page 1.

Page 2 and Page 3 – Individual Vehicle Information

Sponsors seeking to purchase low-emission vehicles should complete the Page 2 worksheet(s) for AIP funding and the Page 3 worksheet(s) for PFC funding. Both AIP and PFC vehicle worksheets are designed to accommodate only one vehicle type per page. Therefore, additional copies of Page 2 and Page 3 are required for applications that involve the purchase of multiple vehicle types. For instance, a VALE program that is seeking AIP funds to purchase 20 identical CNG-powered buses, 30 identical hybrid LDVs, and 10 identical electric fork lifts would need to complete Page 2 three separate times.

Completion of all eight sections on Page 2 and/or Page 3 is mandatory.

Vehicle Identification – Provide the anticipated date (mm-yyyy) of deployment for new vehicles, which should coincide with schedule information provided in the air quality proposal. In addition, the vehicle owner, model, model year, and manufacturer are required.

Vehicle Class – Check boxes to indicate if the new vehicle(s) is GSE or GAV. This information determines the technique used for emissions quantification. In general, any vehicle with a registered license plate to travel on-road is GAV. For instance, a catering truck typically found on the airfield supplying aircraft with provisions is usually GSE. However, many catering trucks travel on public roadways to get to/from the flight kitchen. This requires license plates and, in turn, an on-road engine. In this case, the catering truck would be considered an on-road vehicle and the GAV box should be checked. Other possible transitional vehicles are fuel trucks and deicer trucks.

Alternative Fuel Type – Place an “X” next to the alternative fuel that is being used for the proposed vehicle type.

Replacement Conventional Fuel Type – Place an “X” next to the conventional fuel that is being replaced or displaced, and used for the quantification of baseline emissions.

Unit Cost Per Vehicle – Provide the unit cost and useful life information for the proposed low-emission vehicle(s). Vehicle useful life estimates are provided in Chapter 4 of this Technical Report. If Chapter 4 does not provide an estimate for a particular project vehicle type, and no documentation is available from the manufacturer, then use a default value of 10 years. The vehicle base cost is the purchase price of the same or equivalent new conventional fuel vehicle. The incremental cost is the difference in total purchase price between the proposed VALE low-emission vehicle and the same or equivalent new conventional fuel vehicle. Finally, on Page 2 only, place a “Y” in the box if PFCs will be used as the required local match for AIP funding, or place an “N” in the box if other local revenue sources are used as the AIP match.

Airport Vehicle Type – Place the number of proposed VALE vehicles in the appropriate box next to the listed vehicle type. If a particular vehicle type is not available, use the “Other” line (Page 2 cell Q26; Page 3 cell Q27) to provide a descriptive label of the proposed vehicle type. As a reminder, there should be only one proposed VALE vehicle type identified in this section. For projects that propose multiple vehicle types, Page 2 (AIP) and Page 3 (PFC) must be repeated for each unique vehicle type.

Replacement of Old Vehicles – If funds are being used to purchase new vehicles that will replace/retire existing old vehicles, then supply information about the existing older vehicle(s) in this section. Such information should include: make, model, unique airport vehicle identification number, model year, horsepower size of the engine, average miles per year or hours per year vehicle usage, the method of disposal of the old vehicle, and the remaining useful life (RUL) of the vehicle at the time of anticipated retirement.

Summary – The worksheet will automatically summarize the financial project costs and grant cost share for the unique VALE vehicle type. Failure to provide complete information in the prior sections will result in an inaccurate automated summary.

Page 4 – VALE Infrastructure Summary Sheet

Sponsors should complete this worksheet if the project proposal involves low-emission infrastructure.

Begin entry to this worksheet by entering the "Total Cost" of the infrastructure item in the last column. Depending on the size of the airport, the worksheet will then automatically enter values for "AIP Funding" and "Required Local Matching Funds". These values may need to be modified for a few selected airports (see AIP Handbook, 5100.38C Appendix 23). Next, enter any *direct* PFC funding used for the project. Direct PFC funding does not include PFC funding used for "Required Local Matching Funds". Finally, add any "Additional Matching Funds" used for the AIP-eligible portion of the project. Other column information includes:

Description – Provide a brief description of the individual low-emission infrastructure projects. If possible, provide important size parameters, major components, fuel types, and other information that matches the description in the air quality proposal.

Start-up Date – Provide the anticipated time for the infrastructure project to become fully functional. The dates should be in the format of (mm-yyyy) and coincide with the project schedule provided in the air quality proposal.

Estimated Operating Life – Provide the estimate operating (useful) life in years for each low-emission infrastructure project proposed.

Number of Units – Provide the number of identical or similar equipment.

Use of PFCs for matching funds (Y/N) – Indicate if this is true (Y) or not (N).

Page 5 – Project Funding Summary Sheet

This worksheet summarizes the total low-emissions project costs by AIP, PFC, and other airport funds. Each cell in this worksheet is automatically populated per the entries of Pages 1 through 4.

> *AIP Requested Funding for Vehicles* should be the sum of cell Q35 for each Page 2 worksheet used in the project application.
>
> *AIP Requested Funding for Infrastructure* should be the sum of cell G18 for each Page 4 worksheet used in the project application.
>
> *PFC Requested Funding for Vehicles* should be the sum of cell Q36 for each Page 2 worksheet and cell Q39 for each Page 3 worksheet used in the project application.
>
> *PFC Requested Funding for Infrastructure* should be the sum of cell H18 for each Page 4 worksheet used in the project application.
>
> *Other Local Funds for Vehicles* should be the sum of cell Q37 for each Page 2 worksheet used in the project application.
>
> *Other Local Funds for Infrastructure* should be the sum of cell I18 for each Page 4 worksheet used in the project application.

Page 6 – Project Cost Effectiveness Summary Sheet

This worksheet summarizes the total cost effectiveness of the proposed VALE project. The sponsor should enter the cumulative emission reductions for the total project lifetime indicated on Page 1, as calculated in the EDMS analysis. The cost effectiveness will automatically appear per pollutant.

FAA Voluntary Airport Low Emission Program
PAGE 1. GENERAL INFORMATION

Airport Name:	______	3-Letter Airport ID:	______
Contact Person:	______	Air Quality Proposal Date:	______
Mailing Address:	______	Phone:	______
Email Address:	______	Fax:	______

What is the air quality status of the region? (Place an "X" for all designations that apply)			
☐	Ozone (O_3) 8-hour standard	☐	Nonattainment
		☐	Maintenance
	Particulate Matter (PM)		
☐	PM_{10}	☐	Nonattainment
		☐	Maintenance
☐	$PM_{2.5}$	☐	Nonattainment
		☐	Maintenance
☐	Carbon Monoxide (CO)	☐	Nonattainment
		☐	Maintenance
☐	Nitrogen Dioxide (NO_2)	☐	Nonattainment
		☐	Maintenance
☐	Sulfur Dioxide (SO_2)	☐	Nonattainment
		☐	Maintenance

Hub Designation (place "X" in one)[1]			
Large	Medium	Small	Non-hub

[1/] Per the criteria in FAA Order 5100.38B and subsequent updates.

AERC Option on Project Life

AERC Option: The sponsor may obtain AERCs up to 20 years for vehicles and equipment with shorter useful lives. The AERC Option requires a separate ER Report that includes the VALE-funded years plus the additional option years. (Note: FAA's evaluation of project cost effectiveness does not include emission reductions for the extra AERC Option years.)

(Check for AERC Option)

☐ AERC Option: Sponsor commits to replacing VALE-funded vehicles and equipment with equivalent or cleaner low-emission technology.

(Check below if AERC Option above does not include all project vehicles and equipment)

☐ AERC Option applies only to some VALE-funded vehicles and equipment (attach detailed explanation)

PAGE 2. AIP-funded - INDIVIDUAL VEHICLE INFORMATION

(Repeat the completion of this sheet for each VALE vehicle type to be acquired using AIP funds)[1]

Air Quality Proposal Date:

Vehicle Identification

Anticipated Vehicle(s) Deployment Date: ________

Owner: ________

Model and Model Year: ________

Manufacturer: ________

Vehicle Class (check one)

- ☐ Ground Support Equipment (GSE) (nonroad & unlicensed)
- ☐ Ground Access Vehicle (GAV) (licensed for onroad use)

Alternative Fuel Type (check one)

- ☐ Electric
- ☐ CNG (compressed natural gas)
- ☐ LNG (liquified natural gas)
- ☐ LPG (liquified petroleum gas/propane)
- ☐ Hybrid Technology
- ☐ Hydrogen (Fuel Cell)
- ☐ Ethanol 85
- ☐ Methanol 85
- ☐ Coal-derived liquid fuels
- ☐ Biodiesel (100%)
- ☐ Other ________

Replacement Conventional Fuel Type (check one)

- ☐ Diesel
- ☐ Gasoline
- ☐ Other ________

Unit Cost Per Vehicle

Avg. Useful Life (years):[2] ________

Vehicle Base Cost ($):[3] ________

Incremental Cost ($):[4] ________

AIP Funding Share per Vehicle/Incremental Cost:

Matching Funds Required:

Use PFCs for matching funds (Y/N)? ☐

Airport Vehicle Type
(place number of proposed vehicles in box next to type - choose only one vehicle type per worksheet)

☐ Air Conditioning Unit	☐ Fuel Truck	☐ Passenger Car
☐ Baggage Tug	☐ Generator	☐ Passenger Van
☐ Belt Loader	☐ Ground Power Unit	☐ Service Van
☐ Cargo Loader	☐ Fire Truck	☐ Pickup Truck
☐ Cargo Tractor	☐ Lavatory Truck	☐ 22' Shuttle
☐ Catering Truck	☐ Pushback Tractor	☐ 30-35' Bus
☐ Deicer Truck	☐ Sweeper	☐ 40' Bus
☐ Fork Lift	☐ Sport Utility Vehicle (SUV)	☐ Other ________

If proposed VALE program includes the replacement of old vehicles, provide old vehicle info below:

	Make/Model/Vehicle ID	Model Year	Hp	Avg. miles/year or hours/year	Method of Disposal of old vehicle	RUL[5] (yr)
1						
2						
3						
4						
5						
6						
7						
8						
9						

Repeat this page as needed for each proposed vehicle type.

Summary

Total Number of Proposed Vehicles:	
Total Request for AIP Funding Share:	
Total PFC Matching Funds Requested:	+
Total Other Matching Funds:	+
Total Incremental Cost:	=

1/ Multiple vehicles can be listed only if they're IDENTICAL vehicle types (i.e., same model, year etc.) Otherwise, a separate vehicle information sheet (this page) must be prepared.

2/ Refer to Table 4-1 in the VALE program Technical Report.

3/ "Vehicle Base Cost" is the purchase price of the same or equivalent new conventional-fuel (gas/diesel) vehicle. This is not eligible for AIP funding, except for emergency and safety vehicles (FAA Order 5100.38B).

4/ The "Incremental Cost" is the difference in total purchase price between the proposed VALE vehicle and the same, or closely similar, new conventionally fueled (gas/diesel) vehicle (Base Cost).

5/ RUL = Remaining Useful Life (see Technical Report, Chapter 4).

PAGE 3. PFC-funded - INDIVIDUAL VEHICLE INFORMATION

(Repeat the completion of this sheet for each VALE vehicle type to be acquired using PFC funds)[1]

Air Quality Proposal Date:

Vehicle Identification	Vehicle Class (check one)	Alternative Fuel Type (check one)	Replacement Conventional Fuel Type (check one)
Anticipated Vehicle(s) Deployment Date: ______	☐ Ground Support Equipment (GSE) nonroad, unlicensed	☐ Electric	☐ Diesel
Owner: ______	☐ Ground Access Vehicle (GAV) licensed for onroad use	☐ CNG (compressed natural gas)	☐ Gasoline
Model and Model Year: ______		☐ LNG (liquified natural gas)	☐ Other ______
Manufacturer: ______		☐ LPG (liquified petroleum gas/propane)	
		☐ Hybrid Technology	
		☐ Hydrogen (Fuel Cell)	
		☐ Ethanol 85	
		☐ Methanol 85	
		☐ Coal-derived liquid fuels	
		☐ Biodiesel (100%)	
		☐ Retrofit/Rebuild	
		☐ Other ______	

Unit Cost Per Vehicle

Avg. Useful Life (years):[2] ______
Vehicle Base Cost ($):[3] ______
Incremental Cost ($):[4] ______

Incremental Funding/Vehicle:

Airport Vehicle Type
(place number of proposed vehicles in box next to type - choose only one vehicle type per worksheet)

☐ Air Conditioning Unit	☐ Fuel Truck	☐ Passenger Car
☐ Baggage Tug	☐ Generator	☐ Passenger Van
☐ Belt Loader	☐ Ground Power Unit	☐ Service Van
☐ Cargo Loader	☐ Fire Truck	☐ Pickup Truck
☐ Cargo Tractor	☐ Lavatory Truck	☐ 22' Shuttle
☐ Catering Truck	☐ Pushback Tractor	☐ 30-35' Bus
☐ Deicer Truck	☐ Sweeper	☐ 40' Bus
☐ Fork Lift	☐ Sport Utility Vehicle (SUV)	☐ Other ______

If proposed VALE program includes the replacement of old vehicles, provide old vehicle info below:

	Make/Model/Vehicle ID	Model Year	Hp	Avg. miles/year or hours/year	Method of Disposal of old vehicle	RUL[5] (yr)
1						
2						
3						
4						
5						
6						
7						
8						
9						

Repeat this page as needed for each proposed vehicle type.

Summary

Total Number of Proposed Vehicles:

Total Requested PFC Funding for Incremental Cost:

1/ Multiple vehicles can be listed only if they're IDENTICAL vehicle types (i.e., same model, year etc.) Otherwise, a separate vehicle information sheet (this page) must be prepared.
2/ Refer to Table 4-1 in the VALE program Technical Report.
3/ "Vehicle Base Cost" is the purchase price of the same or equivalent new conventional-fuel (gas/diesel) vehicle. This is not eligible for AIP funding, except for emergency and safety vehicles (FAA Order 5100.38B).
4/ The "Incremental Cost" is the difference in total purchase price between the proposed VALE vehicle and the same, or closely similar, new conventionally fueled (gas/diesel) vehicle (Base Cost).
5/ RUL = Remaining Useful Life (see Technical Report, Chapter 4).

PAGE 4. VALE INFRASTRUCTURE SUMMARY SHEET

Air Quality Proposal Date:

Low Emissions Infrastructure Technololgy or Equipment Units

	Description (including fuel type, size)	Start-up Date	Estimated Operating Life (years)	No. of Units	Use PFCs for matching funds (Y/N)?	AIP Funding	Required Local Matching Funds	PFC Funding[1]	Total Project Funding	Additional Matching Funds[2]	Total Cost[3]
1											
2											
3											
4											
5											
6											
7											
8											
9											
#											
#											
#											
	Totals:										

[1] Direct PFC funding for the project, not PFC funding used for AIP required local match.
[2] Voluntary local contribution above the required match for AIP funding
[3] Begin cost inputs in this column. Include all eligible costs including design, equipment, and installation of infrastructure.

PAGE 5.
PROJECT FUNDING SUMMARY SHEET

Air Quality Proposal Date:

VALE Capital Purchases	AIP Requested Funds	PFC Requested Funds	AIP Matching Funds	Other Local Funds[1]	Total Project Funds[2]
Vehicles					
Infrastructure					
Other Eligible Costs[3]					
Totals					

[1] Voluntary local contribution above the required match for AIP funding (no vehicle base costs).

[2] Total project funds is based on AIP requested funds, PFC requested funds, and AIP matching funds.

[3] Include project formulation.

PAGE 6.
PROJECT COST EFFECTIVENESS SUMMARY SHEET

Air Quality Proposal Date:

Pollutant	Projected Emission Reductions over Useful Life of Project Vehicles and Equipment (tons)	Cost Effectiveness over Useful Life of Project Vehicles and Equipment ($/ton)
NOx		
VOC		
Ozone (NOx + VOC)		
CO		
PM_{10}		
$PM_{2.5}$		
SO_2		

APPENDIX E
PROJECT TRACKING WORKSHEETS

The FAA recommends that sponsors use the following worksheets to meet their project tracking requirements. The FAA prefers the electronic use of the tracking worksheets. Electronic versions of these worksheets can be downloaded at:

http://www.faa.gov/airports/environmental/vale.

FAA Voluntary Airport Low Emission
PAGE 1. TRACKING FORMS - GENERAL

Airport Name:	____________	3-Letter Airport ID:	____________
Contact Person:	____________	Calendar Year	____________
Mailing Address:	____________	Phone:	____________
Email Address:	____________	Fax:	____________

DESCRIPTION OF TRACKING WORKSHEETS

The FAA provides these VALE project tracking worksheets to help sponsors monitor the emissions performance and cost effectiveness of VALE projects. Following a calendar year of operations, the sponsor should complete these forms and keep them on file for purposes of updating reports to the State air quality agency for AERCs, facilitating FAA review, and providing information to the public upon request.

PAGE 1 - General Information

This sheet should be updated as needed to reflect changes in contact information.

PAGE 2 - Vehicle Tracking

Annual operational data and maintenance costs should be kept for each VALE-funded vehicle. Copies of PAGE 2 should be made as necessary. The annual emissions should be calculated for each VALE-funded vehicle and recorded in the lower right corner. This information, as well as supporting EDMS documentation, will need to be comunicated to the State air quality agency for AERC issuance and use.

PAGE 3 - Infrastructure Tracking

Annual operating data and maintenance costs should be kept for VALE-funded infrastructure.

PAGE 4- Emissions Tracking Worksheet

Total project emissions (vehicles + infrastructure use) should be calculated on an annual basis. Total emissions should be entered into the "project" columns. The baseline emissions should be identical or consistent with what was calculated in the initial project application. Emission reductions (ERs) for each project year are automatically calculated as the difference between "baseline" and "project." A running cumulative emissions reduction will automatically appear at the top of the page.

PAGE 2. INDIVIDUAL VEHICLE INFORMATION

(Repeat the completion of this sheet for each VALE vehicle)

Calendar Year: ____________

Vehicle Identification	Vehicle Class Information	Alternative Fuel Type (check one)	Program ID Information
Vehicle Airport Deployment Date: ____________	☐ Ground Support Equipment (GSE) nonroad, unlicensed	☐ Electric	Unique Airport Vehicle ID: ____________
	<OR>	☐ CNG (compressed natural gas)	
Make, Model, & Model Year: ____________	☐ Ground Access Vehicle (GAV) licensed for onroad use	☐ LNG (liquified natural gas)	License Plate (if applicable): ____________
		☐ LPG (liquefied petroleum gas/propane)	
Vehicle Owner: ____________ Hp: ____		☐ Hybrid Technology	
		☐ Hydrogen (Fuel Cell)	
		☐ Ethanol 85	
		☐ Methanol 85	
	☐ Vehicle leased to a Tenant (Y/N)?	☐ Coal-derived liquid fuels	☐ Does vehicle have required VALE Program label affixed (Y/N)?
		☐ Biodiesel (85-100%)	
VIN or Serial Number: ____________	If yes, to whom? ____________	☐ Retrofit/Rebuild	
		☐ Other ____________	

Annual Vehicle Usage

Avg. Useful Life (years):[1] ____________

Original Vehicle Purchase Price: ____________

For this calendar year, complete all that apply:

Miles traveled: ____________

Hours operated: ____________

Annual Fuel Use: ____________

Fuel use units: ____________

Airport Vehicle Type (choose only one vehicle type per worksheet)

☐ Air Conditioning Unit	☐ Fuel Truck	☐ Passenger Car
☐ Baggage Tug	☐ Generator	☐ Passenger Van
☐ Belt Loader	☐ Ground Power Unit	☐ Service Van
☐ Cargo Loader	☐ Fire Truck	☐ Pickup Truck
☐ Cargo Tractor	☐ Lavatory Truck	☐ 22' Shuttle
☐ Catering Truck	☐ Pushback Tractor	☐ 30-35' Bus
☐ Deicer Truck	☐ Sweeper	☐ 40' Bus
☐ Fork Lift	☐ Sport Utility Vehicle (SUV)	☐ Other ____________

Maintenance Records

	Description of Maintenance	Service Date	Maintenance Cost ($)
1			
2			
3			
4			
5			
6			
7			
8			
			$ -

Annual Emissions Summary

Calculate annual emission based on the operating parameters of the vehicle(s) listed on this worksheet.

Pollutant	Annual Emissions (tons per year)
NOx	
VOC	
CO	
PM10	
PM2.5	
SOx	

Repeat this page as needed for each VALE vehicle type.

1/ Refer to Tables 7-1 and 8-1 in the VALE program Technical Report.

PAGE 3. VALE INFRASTRUCTURE TRACKING SHEET

Calendar Year:

Low Emissions Infrastructure Technololgy or Equipment Units

	Description of Low Emission Infrastructure	Start-up Date	Estimated Operating Life (years)	No. of Units	Original Purchase Price	Does equipment have required VALE label affixed ? (Y/N)	Fuel Throughput (if applicable)	Maintenance Description	Maintenance Cost ($)
1									
2									
3									
4									
5									
6									
7									
8									
9									
#									
#									
#									
	Totals:				$0.00		0.00		$0.00

Repeat this page as needed.

PAGE 4. VALE EMISSION REDUCTIONS (ER) TRACKING

Project Cumulative Emission Reductions Summary					
NOx	VOC	CO	PM10	PM2.5	SOx
0.0	0.0	0.0	0.0	0.0	0.0

All values are in tons per year

	Project Year #1			Project Year #2			Project Year #3			Project Year #4			Project Year #5		
	Baseline	Project	ER	Baseline	Project	ER	Baseline	Project	ER	Baseline	Project	ER	Baseline	Project	ER
NOx			0.0			0.0			0.0			0.0			0.0
VOC			0.0			0.0			0.0			0.0			0.0
CO			0.0			0.0			0.0			0.0			0.0
PM10			0.0			0.0			0.0			0.0			0.0
PM2.5			0.0			0.0			0.0			0.0			0.0
SOx			0.0			0.0			0.0			0.0			0.0

	Project Year #6			Project Year #7			Project Year #8			Project Year #9			Project Year #10		
	Baseline	Project	ER	Baseline	Project	ER	Baseline	Project	ER	Baseline	Project	ER	Baseline	Project	ER
NOx			0.0			0.0			0.0			0.0			0.0
VOC			0.0			0.0			0.0			0.0			0.0
CO			0.0			0.0			0.0			0.0			0.0
PM10			0.0			0.0			0.0			0.0			0.0
PM2.5			0.0			0.0			0.0			0.0			0.0
SOx			0.0			0.0			0.0			0.0			0.0

	Project Year #11			Project Year #12			Project Year #13			Project Year #14			Project Year #15		
	Baseline	Project	ER	Baseline	Project	ER	Baseline	Project	ER	Baseline	Project	ER	Baseline	Project	ER
NOx			0.0			0.0			0.0			0.0			0.0
VOC			0.0			0.0			0.0			0.0			0.0
CO			0.0			0.0			0.0			0.0			0.0
PM10			0.0			0.0			0.0			0.0			0.0
PM2.5			0.0			0.0			0.0			0.0			0.0
SOx			0.0			0.0			0.0			0.0			0.0

	Project Year #16			Project Year #17			Project Year #18			Project Year #19			Project Year #20		
	Baseline	Project	ER	Baseline	Project	ER	Baseline	Project	ER	Baseline	Project	ER	Baseline	Project	ER
NOx			0.0			0.0			0.0			0.0			0.0
VOC			0.0			0.0			0.0			0.0			0.0
CO			0.0			0.0			0.0			0.0			0.0
PM10			0.0			0.0			0.0			0.0			0.0
PM2.5			0.0			0.0			0.0			0.0			0.0
SOx			0.0			0.0			0.0			0.0			0.0

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APPENDIX F
FAA VALE APPLICATION CHECKLIST

FAA staff in the Regions or Airport District Offices (ADO) will use the following checklist to evaluate and review VALE applications for completeness. This checklist should be used prior to the FAA receiving the AERC Letter of Assurance from the State air quality agency.

The goal is to have each element of the checklist answered in the affirmative. A complete checklist with all positive responses does not guarantee funding approval for the VALE application.

VALE Program Checklist for
FAA Airports Environmental Specialists

Airport Name:		**3-Letter Airport ID:**	
Contact Person:		**VALE Proposal Date:**	
Mailing Address:		**Phone:**	
Email Address:		**Fax:**	

All checklist answers should be "Yes"

Determine Airport Eligibility	**Circle One**
1. Is the airport a commercial service airport in the National Plan of Integrated Airport Systems (NPIAS)?	Yes No
2. Is the airport located in an EPA-designated nonattainment or maintenance area for any criteria pollutant? (see airports list on VALE website)	Yes No
3. Is the State air quality agency willing to issue airport emission reduction credits (AERCs) to the airport for a qualified project in accordance with FAA and EPA national program guidance?	Yes No

Coordinate with Airport Sponsor on Project Planning	**Circle One**
1. Is the sponsor informed about low-emission technology options? Sources of information include other airports with VALE projects or experience, local chapters of the DOE Clean Cities Program, and vehicle and engine manufacturers.	Yes No
2. Does the proposed project focus on the "Level 1" criteria pollutant(s) causing nonattainment or maintenance status?	Yes No
3. Is the FAA participating in early meetings between the sponsor, the State air quality agency, and the regional EPA to discuss project ideas and the use of national AERC guidance?	Yes No
4. Is the sponsor aware of program application procedures for AIP and PFC funding? For instance, a PFC proposal is only an "information copy" pending receipt of the State's AERC "Letter of Assurance" to the FAA.	Yes No

Review the Sponsor's Project Application	Circle One
1. Did the sponsor simultaneously submit 2 copies of the application each to the FAA, State air quality agency, and the EPA?	Yes No
2. Is the project application complete, with the following elements detailed in the VALE Technical Report (TR)? ☐ Main narrative (Sections 1-9) ☐ Appendix A: ER Report(s) and project application worksheets ☐ Appendix B: EDMS inputs, outputs, and analysis ☐ Appendix C: Required AERC "Letter of Assurance" from State air quality agency (see Appendix G) ☐ Appendix D: Additional certification, technical and cost information ☐ Appendix E: (If applicable) Draft lease agreement or tenant letter of assurance for leased (AIP or PFC) or tenant-owned vehicles and equipment (PFC only)	Yes No
3. Is the latest version of EDMS used in this application to estimate emission reductions?	Yes No
4. Does the sponsor agree to the "Special Conditions" of the program? (see Chapter 8)	Yes No

Verify General Project Requirements	Circle One
1. Does the proposed use of low-emission technology seem to be reasonable technically?	Yes No
2. Are proposed infrastructure improvements located within the airport boundary?	Yes No
3. Are proposed vehicles airport-dedicated?	Yes No
4. Are requests for vehicle funding limited to the eligible portion of vehicle incremental costs?	Yes No
5. Do estimated levels of vehicle usage seem reasonable?	Yes No
6. Are new project vehicles EPA-certified to program low-emission standards or, if retrofits, EPA-verified?	Yes No
7. Is the project cost effective for "Level 1" pollutants? (see Chapter 9)	Yes No
8. Has the FAA received an acceptable AERC "Letter of Assurance" from the State air quality agency prior to project approval?	Yes No
9. Has the project been assessed under NEPA and General Conformity? (See Section 1.5).	Yes No
10. Has the sponsor included an acceptable letter of assurance or draft lease agreement for any VALE vehicles and equipment that are tenant-owned or leased?	Yes No

Verify Additional AIP Requirements	Circle One
1. Do all project vehicles and systems operate using eligible alternative fuels? (see Chapter 3)	Yes No
2. Are all project vehicles and equipment airport-owned?	Yes No
3. Have competitive bids been completed satisfactorily?	Yes No
4. Have “Buy American” requirements been met?	Yes No

Verify Additional PFC Requirements	Circle One
1. Has the sponsor included a letter of assurance from the tenant that VALE special conditions will be met for all VALE tenant-owned vehicles and equipment?	Yes No

Monitor Project Implementation	Circle One
1. Confirm that AIP grant agreements and/or PFC approvals contain the following “Special Conditions” for the VALE program (per Appendix C): ☐ All vehicles and equipment remain at the airport for their useful life. ☐ All vehicles and equipment are clearly labeled with the VALE logo (sponsor produces labels). ☐ An annual record-keeping system is established to track all project vehicles and equipment (see Appendix E, tracking worksheets). ☐ All vehicles and equipment are replaced during their useful life with equivalent low-emission systems.	Yes No
2. Is the sponsor meeting their schedule of vehicle/equipment acquisition and deployment?	Yes No
3. Has the FAA received a copy of the sponsor’s updated emission reduction estimates when they are submitted to the State air quality agency for issuance of AERCs?	Yes No
4. Has the FAA received a copy of the “AERC Statement” issued by the State air quality agency to the sponsor?	Yes No
5. Has the sponsor identified airport development projects for which it will apply its documented AERCs?	Yes No
6. Has the FAA received a copy of the sponsor’s updated project emission reduction estimates at the time of AERC use?	Yes No

APPENDIX G
STATE AIR QUALITY AGENCY AERC LETTER OF ASSURANCE TO THE FAA

*****The following model Letter of Assurance is required by the FAA*****

Name
Manager, Airports Division
Regional Airports Division and Airport District Office, Federal Aviation Administration
Local Address

To [Manager Name]:

The ______________________(Name of State Air Quality Agency hereafter "Agency") has reviewed the application for airport emission reduction credits (AERCs) received from the _______________________(Name of Airport Sponsor hereafter "Sponsor") on _____________(date by month, day, year). The [Agency] has determined that the proposed low-emission project described in the [Sponsor's] application meets the requirements of the Clean Air Act and is consistent with Vision 100 (P.L. 108-176) as implemented by the Federal Aviation Administration (FAA) Voluntary Airport Low Emission (VALE) "*Technical Report*" and associated U.S. Environmental Protection Agency (EPA) "*Guidance on Airport Emission Reduction Credits for Early Measures through Voluntary Airport Low Emission Programs.*"

The preliminary review of the [Sponsor's] VALE project application indicates that the emission reduction estimates are reasonable and accurate. Based on this review, the [Agency] accepts [Sponsor's] application and will make a timely future determination of AERCs based solely on VALE and AERC program guidance in relation to general conformity and new source review (NSR) regulations. Approved AERCs for general conformity will be granted by the [Agency] on a one-to-one basis (project emission reductions to AERCs by pollutant), while AERCs for NSR will be granted, if eligible, on a similar basis or according to [Agency] NSR regulations and procedures.

The [Agency] will grant AERCs to the [Sponsor] following FAA project funding and its receipt of updated [Sponsor] emission reduction estimates. The AERCs for this project may only be used at [Airport Name]. The [Sponsor] is responsible for project tracking and record-keeping and for making this information available to the [Agency] and public as requested.

Sincerely,

Director of the State Air Quality Agency cc: VALE Program, Office of Airports, Planning and Environmental Division, APP-400, 800 Independence Ave., SW, Washington, DC 20591

EPA Region

APPENDIX H
SAMPLE STATE AIR QUALITY AGENCY AERC STATEMENT WITH SPONSOR LETTER OF REQUEST:

AERC STATEMENT
ISSUED APRIL 28, 2008

BY

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

TO

HOUSTON AIRPORT SYSTEM

FOR EMISSION REDUCTIONS ACHIEVED THROUGH THE VALE PROGRAM AT GEORGE BUSH INTERCONTINENTAL AIRPORT

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

April 28, 2008

Mr. James Parise
Senior Environmental Investigator
Houston Airport System
P.O. Box 60106
Houston, Texas 77205-0106

RE: Airport Emissions Reduction Credit Statement
City of Houston - Houston Airport System, George Bush Intercontinental Airport

Dear Mr. Parise:

This letter is in response to your February 26, 2008, request for Airport Emissions Reduction Credits (AERCs) pertaining to the purchase and use of low-emissions vehicles at George Bush Intercontinental Airport (IAH). We appreciate the opportunity to work with the Houston Airport System (HAS) to improve air quality in the Houston region under the Federal Aviation Administration Voluntary Airport Low Emissions program.

We have reviewed the project operational data and the methodology used to calculate IAH annual emissions reductions for major criteria pollutants. We agree with the annual emissions reduction estimates provided for the 23 hybrid electric vehicles in operation at IAH over their project life. Based on the EPA "Guidance on Airport Emissions Reduction Credits for Early Measures through Voluntary Airport Low Emissions Programs," we have evaluated the reasonableness of the emissions reduction estimates and HAS may use these credits towards meeting future general conformity requirements.

The enclosed AERC Statement is intended to facilitate HAS' airport planning and ability to meet future general conformity requirements for the airport. Prior to use of the AERCs, HAS is expected to coordinate with the TCEQ to provide us with updated project information to verify the continued accuracy of IAH project emissions reductions for the AERCs. If you require further assistance on this matter, please contact Mr. Koy Howard of my staff at (512) 239-2306 or kohoward@tceq.state.tx.us.

Sincerely,

Susana M. Hildebrand, P.E.
Director, Air Quality Division

SMH/KH/sy

Enclosure

P.O. Box 13087 • Austin, Texas 78711-3087 • 512-239-1000 • Internet address: www.tceq.state.tx.us

AIRPORT EMISSIONS REDUCTION CREDIT (AERC) STATEMENT
FOR APPLICATION OF FUTURE GENERAL CONFORMITY REQUIREMENTS

George Bush Intercontinental Airport (IAH) - Houston Airport System
Voluntary Airport & Low Emissions (VALE) Projects in 2005 and 2007 (tons/year)

Year	CO	VOC	NO_x	PM-10	PM-2.5
2008	1.403	0.079	0.113	0.007	0.003
2009	1.022	0.063	0.118	0.007	0.003
2010	0.813	0.044	0.096	0.007	0.003
2011	0.363	0.014	0.059	0.006	0.002
2012	0.363	0.014	0.059	0.006	0.002
2013	0.363	0.014	0.059	0.006	0.002
2014	0.363	0.014	0.059	0.006	0.002
2015	0.208	0.007	0.017	0.001	0.000
2016	0.208	0.007	0.017	0.001	0.000
Cumulative Total	**5.106**	**0.597**	**0.256**	**0.047**	**0.017**

CITY OF HOUSTON
HOUSTON AIRPORT SYSTEM

Bill White
Mayor

Richard M.Vacar, A.A.E.
Director of Aviation

George Bush Intercontinental ~ William P. Hobby ~ Ellington Field

February 26, 2008

FedEx Tracking Number: 8641 7254 5817
Mr. Koy Howard
Texas Commission on Environmental Quality
MC 164
12100 Park 35 Circle
Austin, Texas 78753

RE: Airport Emission Reduction Credit (AERC) Statement
City of Houston – Houston Airport System, George Bush Intercontinental Airport

Dear Mr. Howard:

This letter is to request that the Texas Commission on Environmental Quality (TCEQ) issue an Airport Emission Reduction Credit (AERC) Statement to the Houston Airport System (HAS) for emission reductions achieved at George Bush Intercontinental Airport (IAH) under the Federal Aviation Administration (FAA) Voluntary Airport Low Emission Program (VALE). Specifically, an "AERC Statement" is requested for the HAS purchase and operation at IAH of 23 hybrid electric vehicles (HEVs) obtained with VALE assistance [3-48-0111-056-2005; 3-48-0111-064-2007]. The project HEVs consist of Toyota Prius and Ford Escape hybrids (listed in Attachment A), nine of which were purchased in 2005 and fourteen of which were purchased in 2007.

Based on methodology set forth in the *VALE Technical Report*, HAS has calculated the emission benefits of using the HEVs at IAH. These emission reductions are based on the comparison of emissions that would be generated by the use of conventionally-fueled vehicles against the emissions that are and will be generated from the HEVs. These reductions are summarized in Attachment A, Table 3 and are calculated using FAA's most recent version (5.02) of the Emissions and Dispersion Modeling System with Mobile 6 or VALE baseline emission factors and VALE low-emission standards for new on-road light-duty vehicles (i.e., EPA Tier II, Bin 3). The project reductions for major criteria pollutants are summarized for individual years throughout the ten-year useful life of the vehicles.

Houston Airport System: 16930 John F. Kennedy Blvd. Houston Texas 77032 ~ PO Box 60106 77205-0106 ~ 281 233-3000 Fax 281 233-1874
www.Fly2Houston.com. ~ www.houstontx.gov

For purposes of determining emission reductions from the HEVs, HAS is using rece
data for those vehicles at IAH. The Escape HEVs are being driven an average of 11
per year and the Prius HEVs are being driven an average of 18,000 miles per year. I
actual mileage also improves our estimations of future usage. We will continue to n
usage and update mileage levels over the course of the project to ensure that project
reductions and AERCs remain accurate. We will consult with you again on our calc
prior to a decision to use the AERCs for general conformity.

We appreciate your attention to this request. If you need further information, please
hesitate to call me at (281) 233-1756.

Sincerely,

James H. Parise. P.G.
Senior Environmental Investigator
Operations Services

jhp

Enclosures: Attachment A:
- Table 1 - VALE Vehicle Acquisition Inventory
- Table 2 - Vehicle Emission Factors
- Table 3 - Summary of Hybrid Electric Vehicle Emission Reduc

Sample Letter of Response
Attachment B: Sample AERC Statement

cc: Ben Guttery, FAA Texas Airport District Office
Dean McMath, FAA Airports Office, Southwest Region
Jake Plante, FAA Airports Office, Headquarters

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Attachment A

Table 1
VALE VEHICLE ACQUISITION INVENTORY
George Bush Intercontinental Airport (IAH) – Houston Airport System

	Fiscal Year Acquired	Model Year	No. of Vehicles
Toyota/Prius	2005	2005	5
Ford/Escape	2005	2006	5*
Toyota/Prius	2007	2007	3
Ford/Escape	2007	2008	11
IAH Total			23

Source: HAS VALE Application and HAS records, 2008
* One Ford Escape hybrid was totaled in an accident and therefore is not included in the total and the emission reduction calculations in Table 3.

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Table 2
VEHICLE EMISSION FACTORS
George Bush Intercontinental Airport (IAH) – Houston Airport System

	Emission Factors (grams per vehicle mile)				
	CO	VOC	NOx	PM-10	PM-2.5[1]
FY 2005					
Baseline Scenario					
Standard auto	3.1500	0.1055	0.3150	0.0450	0.0208
Standard SUV	3.1500	0.1055	0.3150	0.0450	0.0208
Proposed (with VALE)					
Hybrid Toyota Prius	2.1000	0.0550	0.0300	0.0100	0.0046
Hybrid Ford Escape	2.1000	0.0550	0.0300	0.0100	0.0046
FY 2007					
Baseline Scenario[2]					
Chevrolet Lumina	11.0925	0.5527	0.5120	0.0251	0.0115
Ford Expedition	13.5904	0.7076	0.6297	0.0253	0.0117
Jeep Cherokee	20.1376	1.2600	1.1240	0.0253	0.0117
Standard auto	3.1500	0.0900	0.1150	0.0150	0.0069
Standard SUV	3.1500	0.0900	0.1150	0.0150	0.0069
Proposed (with VALE)					
Hybrid Toyota Prius	2.1000	0.0550	0.0300	0.0100	0.0046
Hybrid Ford Escape	2.1000	0.0550	0.0300	0.0100	0.0046

Source: EDMS with Mobile 6 and VALE Program Technical Reports, 2008

1. PM2.5 emission factors are based on the ratio of PM10 to PM2.5 (46 percent) derived from Mobile 6.2 for the Chevy Lumina, Ford Expedition, and Jeep Cherokee
2. The old vehicles replaced were two Chevrolet Luminas (MY '01), one Ford Explorer (MY '01), and one Jeep Cherokee (MY '00). Useful life of 10 years was assumed.

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Table 3
SUMMARY OF HYBRID ELECTRIC VEHICLE EMISSION REDUCTIONS
Houston George Bush Intercontinental Airport

	CO Emission Reductions (tons/year)											
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Vehicle Acquisition	Non-Creditable			Creditable								
FY 2005	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155		
FY 2007			1.126	1.248	0.867	0.658	0.208	0.208	0.208	0.208	0.208	0.208
Totals	0.155	0.155	1.281	1.403	1.022	0.813	0.363	0.363	0.363	0.363	0.208	0.208

Source: HAS Analysis, 2008

	VOC Emission Reductions (tons/year)											
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Vehicle Acquisition	Non-Creditable			Creditable								
FY 2005	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007		
FY 2007			0.065	0.072	0.056	0.037	0.007	0.007	0.007	0.007	0.007	0.007
Totals	0.007	0.007	0.072	0.079	0.063	0.044	0.014	0.014	0.014	0.014	0.007	0.007

Source: HAS Analysis, 2008

	NOx Emission Reductions (tons/year)											
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Vehicle Acquisition	Non-Creditable			Creditable								
FY 2005	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042		
FY 2007			0.066	0.071	0.076	0.054	0.017	0.017	0.017	0.017	0.017	0.017
Totals	0.042	0.042	0.108	0.113	0.118	0.096	0.059	0.059	0.059	0.059	0.017	0.017

Source: HAS Analysis, 2008

Table 3 *(continued)*
SUMMARY OF HYBRID ELECTRIC VEHICLE EMISSION REDUCTIONS
Houston George Bush Intercontinental Airport

	PM-10 Emission Reductions (tons/year)											
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Vehicle Acquisition	Non-Creditable			Creditable								
FY 2005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005		
FY 2007			0.002	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001
Totals	0.005	0.005	0.007	0.007	0.007	0.007	0.006	0.006	0.006	0.006	0.001	0.001

Source: HAS Analysis, 2008

	PM-2.5 Emission Reductions (tons/year)											
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Vehicle Acquisition	Non-Creditable			Creditable								
FY 2005	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002		
FY 2007			0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000
Totals	0.002	0.002	0.003	0.003	0.003	0.003	0.002	0.002	0.002	0.002	0.000	0.000

Source: HAS Analysis, 2008

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